

**THE COUNTY COMMISSIONERS
OF KENT COUNTY, MARYLAND
AGENDA**

January 24, 2023

10:00 AM Call to Order/Pledge of Allegiance/Moment of Silence

Meeting Announcements

Time Is Allotted At The End Of Each Meeting For The Commissioners To Receive
Comments From The Public

Consent Items

#1 - Regular Session Minutes, January 10, 2023

#2 - Liquor Minutes, January 10, 2023

#3 - Closed Session Minutes, January 10, 2023

#4-Rock Hall Volunteer Fire Company, Multiple Gaming Device Raffle, February 1 -
December 18, 2023

Appointments

Ken Kozel, CEO, University of Maryland, Shore Regional Health
University of Maryland Shore Regional Health Update

Departmental Appointments

Carla Gerber, Deputy Director, Planning, Housing, and Zoning
Maryland Agricultural Land Preservation Foundation (MALPF) Matching Funds
Program

Jamie Williams, Director, Economic and Tourism Development
Rural Maryland Economic Development Fund Update

Herbert Dennis, Warden, Kent County Detention Center and Penny Young-Carrasquillo,
Grants Manager

Opioid Use Disorder Treatment Initiative Contract Update

Public Works Director

Fleet Management
Enterprise Lease Agreements

Pat Merritt, Acting Human Resources Director

Parks & Recreation
Full-Time Facility Monitor Vacancy

Emergency Services
EMT-B Vacancies

Emergency Services
Emergency Preparedness Planner Vacancy

Public Works

Building Maintenance Worker I Vacancy

Public Works

Public Works Deputy Director Vacancy

Public Works - Roads Division

Crew Leader Vacancy

Public Works - Roads Division

MEO Vacancy

Public Works - Water and Wastewater

Utility Technician Vacancy

County Administrator

Shelly Neal-Edwards, Director, Department of Social Services

Social Services Advisory Board Member Appointment

County Administrator Report

Mike Moulds, Director of Public Works

Water and Wastewater Division, Worton Lagoon Sludge Removal Contract

Kent Alcohol and Tobacco Enforcement KATE

Bonnie S. Pearsall, Inspector, Kent Alcohol and Tobacco Enforcement

License Update

Bonnie S. Pearsall, Inspector, Kent Alcohol and Tobacco Enforcement

License Update

Bonnie S. Pearsall, Inspector, Kent Alcohol and Tobacco Enforcement

License Modification Application

Bonnie S. Pearsall, Inspector, Kent Alcohol and Tobacco Enforcement

Resolution 2023-01, Tasting and Sampling

Public Comment/Media Review

Procedures For Public Comment

American Rescue Plan Act Funds

American Rescue Plan Act (ARPA) Funds Spend Plan

Contingency Fund

Contingency and Use of Fund Balance Report

Closed Session

Bill Mackey, Director, Planning, Housing and Zoning

Appointments

The meeting was closed under the Annotated Code of Maryland, General Provisions Article § 3-305(b) (1) To discuss the appointment, employment, assignment, promotion, discipline, demotion, compensation, removal, resignation, or performance evaluation of

appointees, employees, or officials over whom this public body has jurisdiction; or any other personnel matter that affects one or more specific individuals.

Patricia Merritt, Acting Director, Human Resources

Personnel

The meeting was closed under the Annotated Code of Maryland, General Provisions Article § 3-305(b) (1) To discuss the appointment, employment, assignment, promotion, discipline, demotion, compensation, removal, resignation, or performance evaluation of appointees, employees, or officials over whom this public body has jurisdiction; or any other personnel matter that affects one or more specific individuals.

Wayne Darrell, Director, Emergency Services

Personnel

The meeting was closed under the Annotated Code of Maryland, General Provisions Article § 3-305(b) (1) To discuss the appointment, employment, assignment, promotion, discipline, demotion, compensation, removal, resignation, or performance evaluation of appointees, employees, or officials over whom this public body has jurisdiction; or any other personnel matter that affects one or more specific individuals.

The Board will recess and reconvene at 6:00 p.m., to discuss the Millington Wastewater Treatment Plant Upgrade Feasibility Study

Mike Moulds, Director, Public Works

Wastewater Treatment Plant Upgrade Feasibility Study Discussion

(Meetings are conducted in Open Session unless otherwise indicated. All or part of County Commissioners' meetings can be held in closed session under the authority of the MD Open Meetings Law by vote of the Commissioners. Breaks are at the call of the President. Please note that times listed for specific items on the agenda are only estimates, and that the order of agenda items may change as time dictates or allows. Meetings are subject to audio and video recordings.)



**Time Is Allotted At The End Of Each Meeting For The Commissioners
To Receive Comments From The Public
1/24/2023
County Commissioners Meeting**



**#1 - Regular Session Minutes, January 10, 2023
1/24/2023
County Commissioners Meeting**

ATTACHMENTS:

Description



**#2 - Liquor Minutes, January 10, 2023
1/24/2023
County Commissioners Meeting**

ATTACHMENTS:
Description



**#3 - Closed Session Minutes, January 10, 2023
1/24/2023
County Commissioners Meeting**

ATTACHMENTS:

Description



**#4-Rock Hall Volunteer Fire Company, Multiple Gaming Device Raffle,
February 1 - December 18, 2023
1/24/2023
County Commissioners Meeting**

ATTACHMENTS:

Description



Ken Kozel, CEO, University of Maryland, Shore Regional Health
1/24/2023
County Commissioners Meeting

Item Summary:

University of Maryland Shore Regional Health Update

ATTACHMENTS:

Description

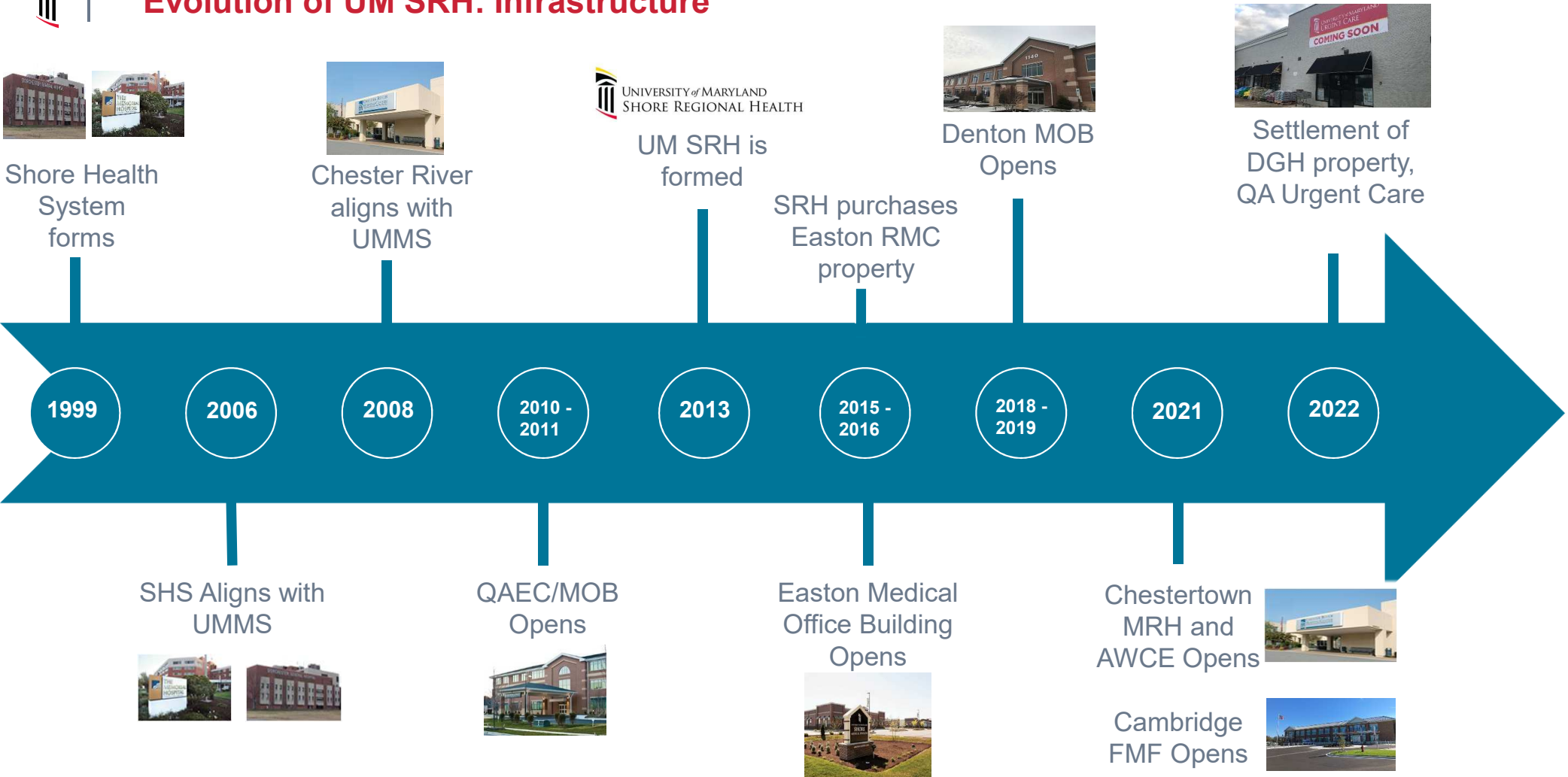
UM SRH Kent County Presentation 012423

UM Shore Regional Health

**Health Care on Maryland's Eastern Shore:
From Vision to Reality**

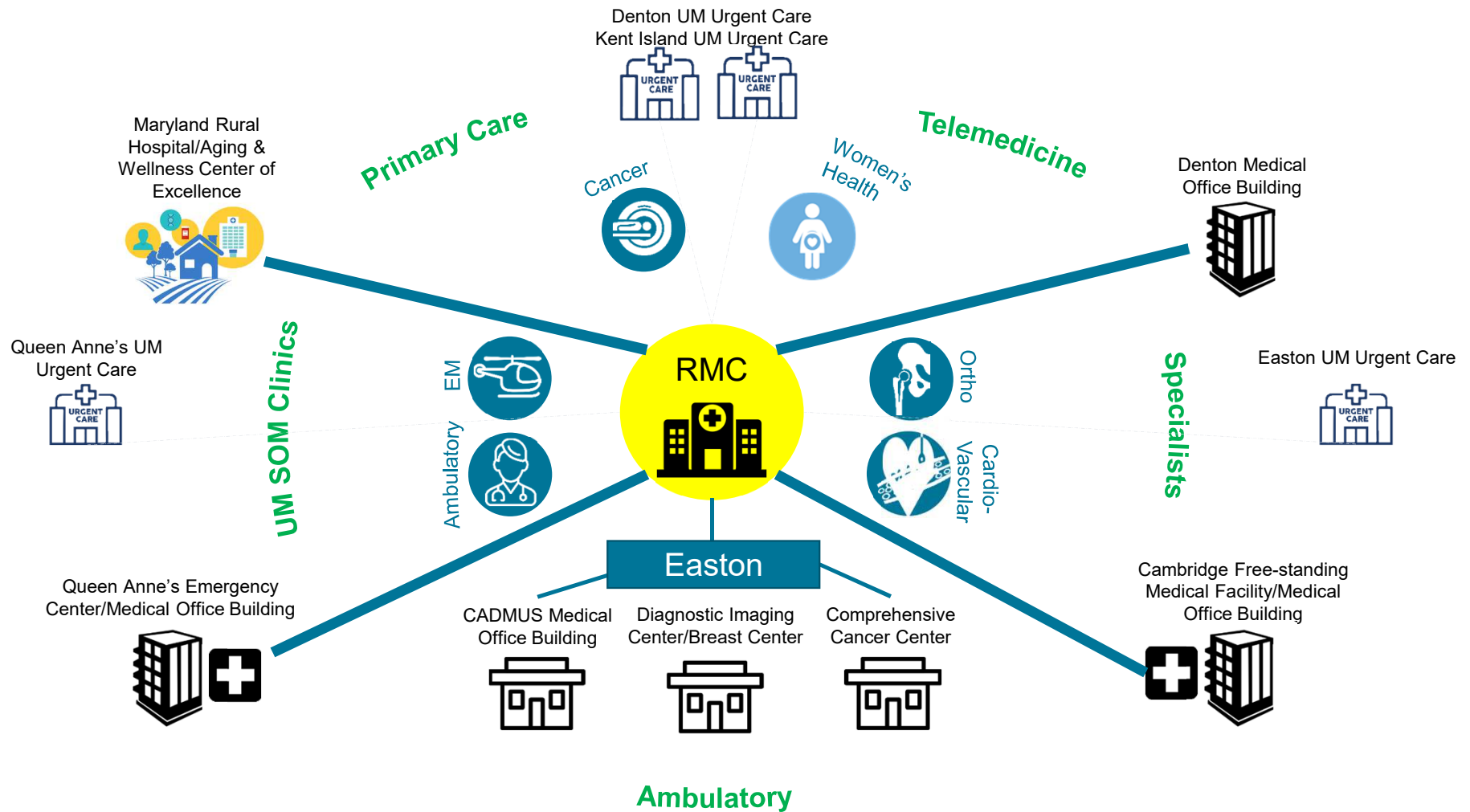


| Evolution of UM SRH: Infrastructure





Mid-Shore Comprehensive Health Care Delivery Plan



compassion | discovery | excellence | diversity | integrity

Easton Regional Medical Center

Location, Size and Board Approval Process



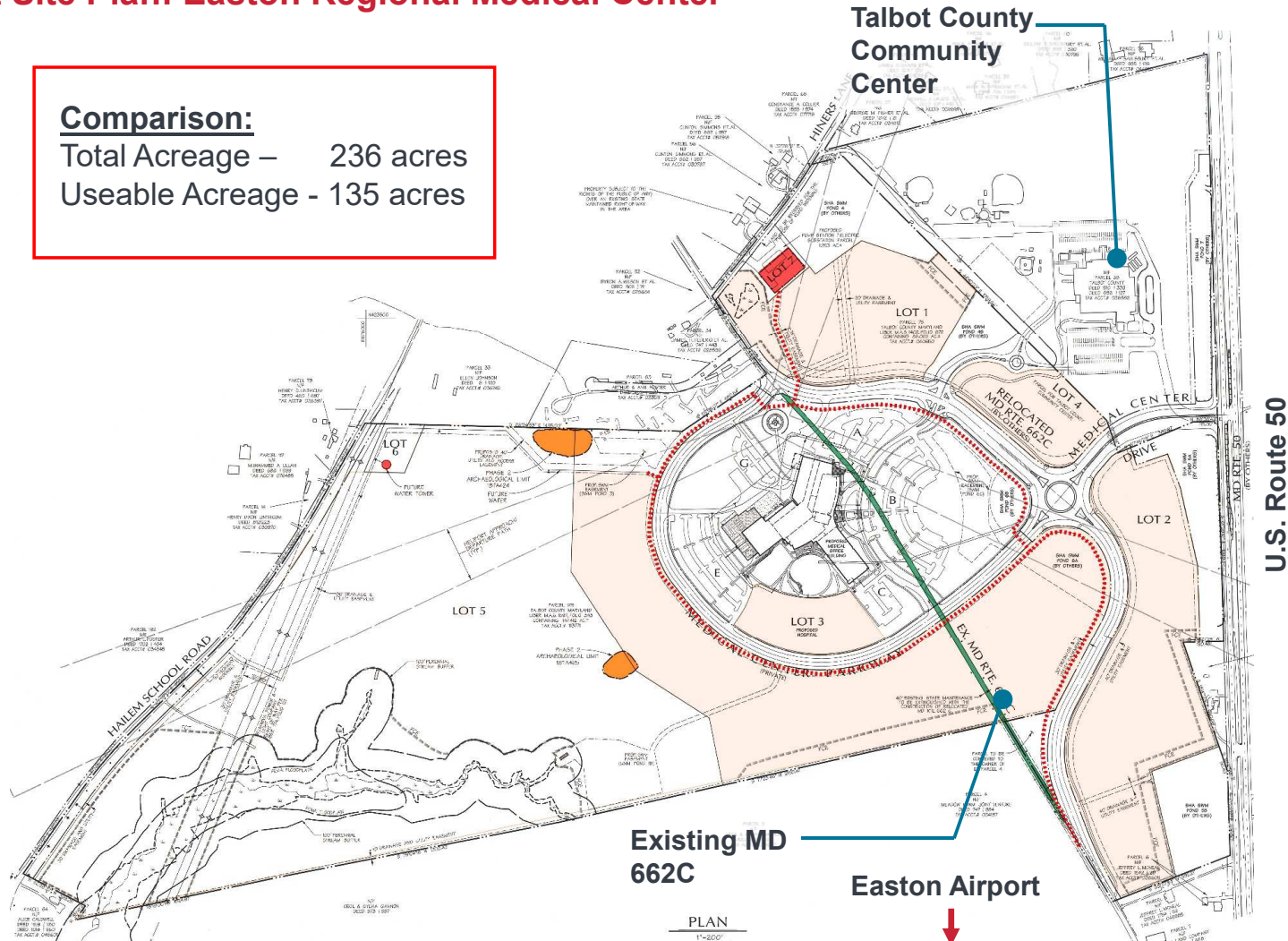


Draft Site Plan: Easton Regional Medical Center

Comparison:

Total Acreage – 236 acres

Useable Acreage - 135 acres



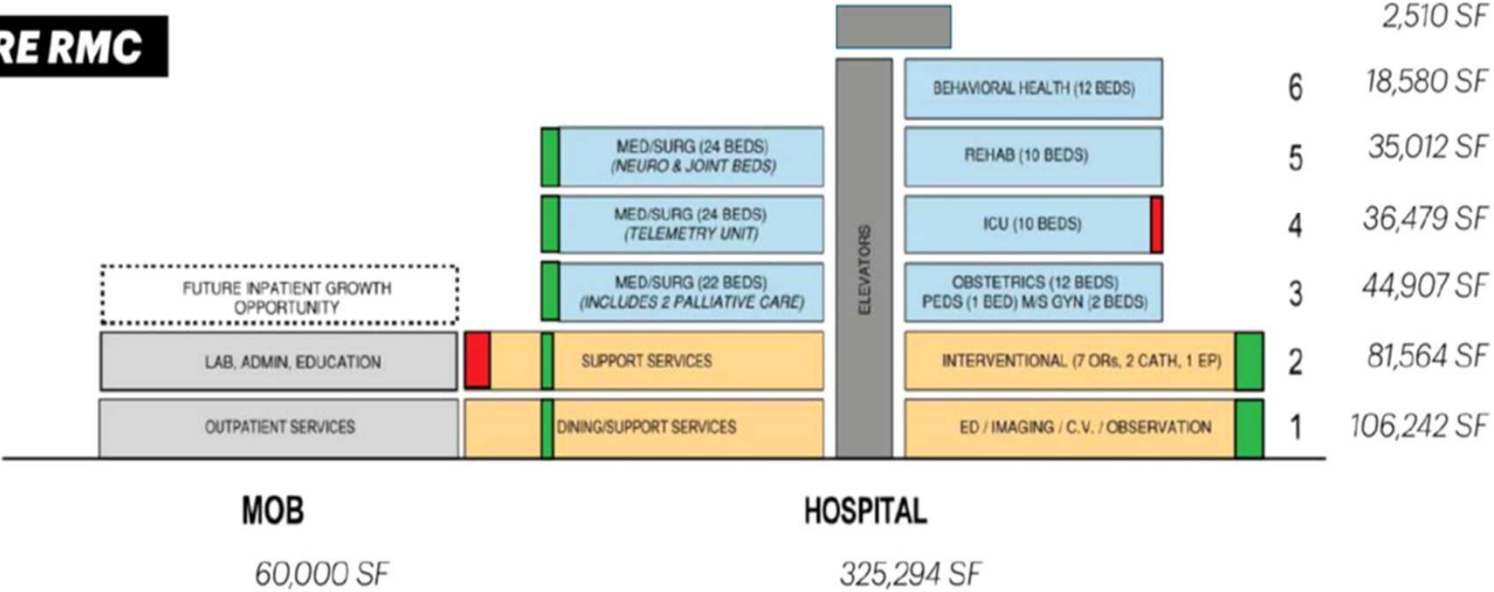
PLAN

1"=200'

compassion | discovery | excellence | diversity | integrity

Regional Medical Center: Draft Design

2022 SHORE RMC



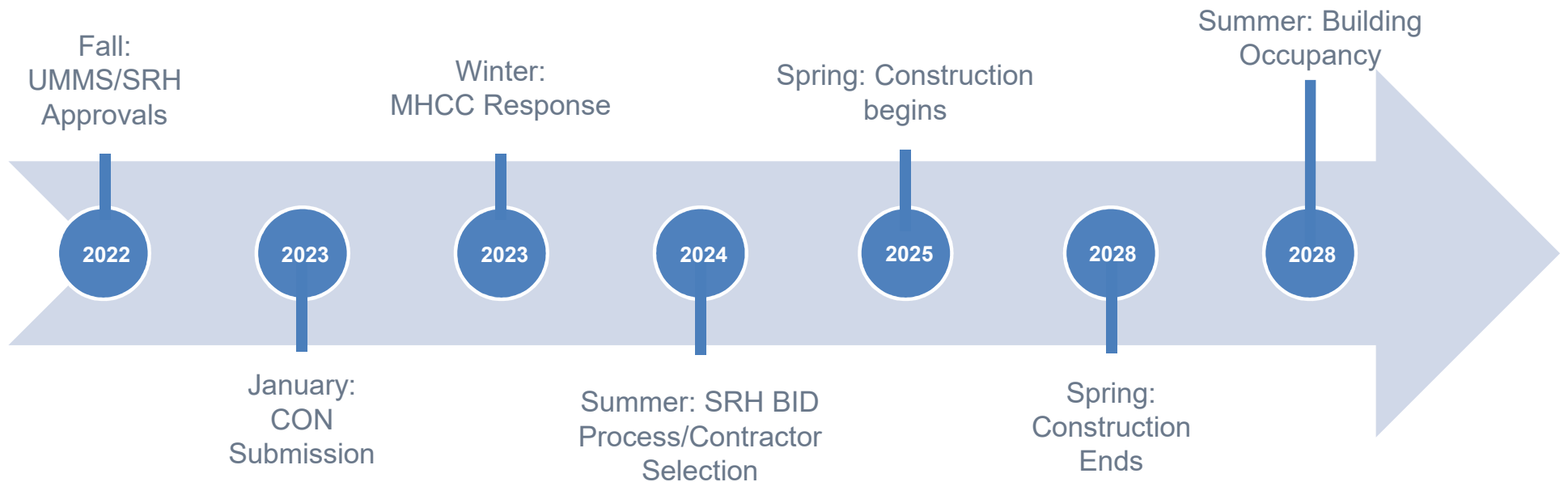
Request for Approval

Management Requests Approval to move forward with the UM SRH Regional Medical Center Investment

- File a Certificate of Need (CON) Application with the Maryland Healthcare Commission (MHCC)
- Work to obtain funding from the Maryland Health Service Cost Review Commission (HSCRC)
- Begin discussions for State and Federal funding
- Initiate Philanthropic Efforts with Key Benefactors and the Community



Easton RMC Project Timeline





compassion | discovery | excellence | diversity | integrity



The UM Shore Regional Health - Easton Regional Medical Center



compassion | discovery | excellence | diversity | integrity



compassion | discovery | excellence | diversity | integrity



compassion | discovery | excellence | diversity | integrity



compassion | discovery | excellence | diversity | integrity



compassion | discovery | excellence | diversity | integrity



Carla Gerber, Deputy Director, Planning, Housing, and Zoning
1/24/2023
County Commissioners Meeting

Item Summary:

Every easement cycle, the Maryland Agricultural Land Preservation Foundation requests each county to participate in the Local Matching Funds program for the purchase of agricultural land preservation easements by the Foundation. The matching funds program enables the county to commit retained agricultural transfer taxes or other available funds to acquire easements, which will be matched on a 60% State, 40% County basis, subject to available funding from the Foundation. At this time, the Foundation needs to know the County's total commitment of local matching funds to be dedicated to the FY 2023 Easement Acquisition Cycle. The funds that are committed may only be used within Kent County for the acquisition of agricultural easements.

ATTACHMENTS:

Description



Jamie Williams, Director, Economic and Tourism Development
1/24/2023
County Commissioners Meeting

Item Summary:

Rural Maryland Economic Development Fund Update

ATTACHMENTS:

Description

08.23.22 Support Letter, Lori, Ratzburg, Senior Director, Regional Growth & Retention, Maryland Department of Commerce, Rural Maryland Economic Development Fund Through Upper Shore Regional Council for Kent County Projects

08.23.22 Resolution 2022-12, Resolution of Support for Rural Maryland Economic Development Fund
Rural Maryland ED Fund Summary of Approved Projects



The County Commissioners of Kent County
P. Thomas Mason, President | Ronald H. Fithian, Member | Robert N. Jacob, Jr., Member
Shelley L. Heller, County Administrator | Thomas N. Yeager, County Attorney

August 23, 2022

Maryland Department of Commerce
Lori Ratzburg, Senior Director, Regional Growth & Retention
401 E. Pratt Street
Baltimore, MD 21202

Re: Support - Rural Maryland Economic Development Fund Through Upper Shore Regional Council for Kent County Projects

Dear Ms. Ratzburg:

The Kent County Commissioners of Kent County, Maryland solicited projects that support economic development in Kent County for the \$2,900,000 allocated by the Upper Shore Regional Council (USRC). Kent County received twelve applications that totaled more than \$6,900,000. There were no inferior projects submitted and the staff is committed to finding other opportunities to support and fund these projects.

At the Kent County Commissioners' meeting on August 3, 2022, three Kent County projects were approved for submission within the USRC's full application, totaling \$3,599,000. The Commissioners approved the additional funding needed to support these three projects through Kent County revenues. The three projects were the Worton Service District Water and Sewer Extension, Millington Wastewater Treatment Facility Expansion, and Route 213 Entrance for the Chestertown Business Campus. Projects were chosen due to their economic impacts, County priorities, and inclusion in previous planning documents approved by the County Commissioners.

Kent County is grateful for this transformational funding opportunity focused on the rural regions of the State of Maryland. Kent County worked with the USRC staff and the region's Economic Development Directors to vet projects that will create jobs and opportunities for growth. Kent County looks forward to working collaboratively with the USRC in its efforts to promote regional economic development.

Very truly yours,
THE COUNTY COMMISSIONERS
OF KENT COUNTY, MARYLAND


P. Thomas Mason, President


Ronald H. Fithian, Member


Robert N. Jacob, Jr., Member

KCC/jlw

cc: Susan O'Neill, Executive Director, Upper Shore Regional Council
Jamie L. Williams, Director, Economic and Tourism Development

RESOLUTION 2022-12

COUNTY COMMISSIONERS OF KENT COUNTY, MARYLAND

**A RESOLUTION TO AUTHORIZE AND SUPPORT THE SUBMITTAL OF THE APPLICATION TO
THE MARYLAND DEPARTMENT OF COMMERCE FOR RURAL MARYLAND ECONOMIC
DEVELOPMENT FUND**

WHEREAS, the State of Maryland created a \$50 million Rural Maryland Economic Development Fund to boost economic development activity, stimulate private sector investment, and grow jobs in the state's rural regions; and

WHEREAS, Five rural regional councils, representing the Upper, Mid, and Lower Eastern Shore, Southern Maryland, and Western Maryland, will each receive \$10 million available through the Maryland Department of Commerce; and

WHEREAS, Kent County is eligible to apply for \$2.9 million in funds from the Rural Maryland Economic Development Fund through the Upper Shore Regional Council (USRC) for Kent County projects and the County Commissioners solicited projects that support economic development activity in the County; and

WHEREAS, Cecil and Queen Anne's Counties submitted projects for \$2.9 million each in funds from the Rural Maryland Economic Development Fund through the USRC; and

WHEREAS, The USRC will apply to utilize \$1.3 million in funds for regional projects; and

WHEREAS, the USRC's board approved the application on August 19, 2022, during a full council meeting; and

WHEREAS, the County Commissioners of Kent County, Maryland understand and acknowledge that they would be responsible for completion of grant activities and any corrective actions including the repayment of funds if necessary; and

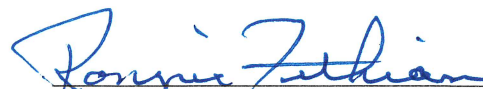
NOW, THEREFORE, BE IT RESOLVED, We, The County Commissioners of Kent County, hereby authorize and support the submittal of the application to the Maryland Department of Commerce for Rural Maryland Economic Development Fund in the amount of \$10 million this 23rd day of August 2022, to support economic development projects detailed in the application.

ATTEST:

THE COUNTY COMMISSIONERS
OF KENT COUNTY, MARYLAND


Sondra Blackiston, Clerk


P. Thomas Mason, President


Ronald H. Fithian, Member


Robert N. Jacob, Jr., Member

ADOPTED: August 23, 2022

Rural Maryland Economic Development Fund

Summary of Approved Projects

Mid Shore Regional Council

Caroline County	7 projects	\$ 3,233,333
Dorchester County	7 projects	\$ 3,233,333
Talbot County	14 projects	\$ 3,233,333
MSRC administrative expenses		\$ 300,001
Total		\$10,000,000

Caroline County - 7 Projects

\$3,233,333

Applicant: County Commissioners of Caroline County

Project: Data Center Shell Building

Amount: \$2,000,000

Design and build through a public/private partnership with Choptank Electric a 10,000 to 20,000 square foot post and frame shell building on a parcel at the Mid Shore Regional Technology and center and provide leads to secure tenants. Construction will be managed by a project manager Business Park. Choptank Electric will outfit with appropriate infrastructure for a boutique data with oversight by the County Administrator and Economic Development Director.

Applicant: Chesapeake College

Project: Future Works Workforce Training

Amount: \$257,500

The \$257,500 investment from Caroline County – together with \$875,500 in Rural Maryland Economic Development Funds from the other four counties –would provide the gap funding needed to fully expand an existing trades program, kick-start a new trades program, help staff a new Center for Innovation and Entrepreneurship, and provide support to non-credit students.

Applicant: Maryland Broadband Cooperative, Inc.

Project: MidShore Optical Broadband Network Upgrades

Amount: \$240,000

To upgrade our backhaul network equipment to meet these demands. Our strategy is to deploy 100-Gigabit capable optical equipment ubiquitously across our statewide network. In the MidShore, we have plans to upgrade and future proof our Points-of-Presence (POP) in Denton, Cambridge, and Wye Mills. This upgrade could benefit every Cooperative Member ISP operating in the region. We're asking for grant funds to help us keep pace with the growing needs of the MidShore.

Applicant: Eastern Shore Entrepreneurship Center, Inc.

Project: Farm to Freezer Facility and Program

Amount: \$300,000

The Chesapeake Farm to Freezer Project involves establishment of a processing & aggregation facility in Caroline County that will help solve a number of problems on the Eastern Shore, to include; 1) a means by which to create a more resilient & sustainable local food system through the availability of locally processed produce, 2) increasing the availability of local nutritious food to those areas of the Eastern Shore having limited access, 3) creating increased revenue & profit margins for local farmers & growers by providing wider access to markets (wholesale, institutional, & retail), and 4) creating the opportunity for growers to scale & diversify their production & increase employment.

Applicant: County Commissioners of Caroline County

Project: Tech Park Development Plan of Action

Amount: \$200,000

Engage a commercial real estate consultant to inform and promote the Mid Shore Regional Technology and Business Park (the Park) to local and national businesses.

Applicant: County Commissioners of Caroline County

Project: West Denton Infrastructure Study

Amount: 100,000

Gather data and information on the potential impact of West Denton development, including the impact to county services associated with such development.

Applicant: County Commissions of Caroline County

Project: Business Attraction Capacity Building

Amount: \$135,833

Utilizing a professional marketing organization, partner with commercial land holders and commercial realtors to promote Caroline County for business expansion and attraction through multiple media outlets, industry specific publications, and in-person events.

Dorchester County - 7 Projects

Applicant: Maryland Broadband Cooperative, Inc.

Project: MidShore Optical Broadband Network Upgrades

Amount: \$240,000

To upgrade our backhaul network equipment to meet these demands. Our strategy is to deploy 100-Gigabit capable optical equipment ubiquitously across our statewide network. In the MidShore, we have plans to upgrade and future proof our Points-of-Presence (POP) in Cambridge, Denton, and Wye Mills. This upgrade could benefit every Cooperative Member ISP operating in the region. We're asking for grant funds to help us keep pace with the growing needs of the MidShore.

Applicant: Cambridge Waterfront Development, Inc.

Project: Cambridge Harbor Streetscape Design and Partial Construction

Amount: \$1,000,000

Cambridge Harbor is a new brand selected by the Community for 34 acres of prime waterfront property entrusted to CWDI to develop in partnership with the community to the benefit of the community, making it an inviting, accessible, active and enjoyable place to live, work, play and visit. The development envelope spans from Cambridge Creek on the west to the old Highway 50 bridge on the east and from the Choptank River on the north to Bryn Street on the south. Included in the plan are significant public open activated waterfront green spaces accessible by water, but primarily reached by foot, bike and car along public roads that need complete renovation to include new paving, added and improved sidewalks, underground utility corridors, streetscaping with benches and plantings, bike racks and other amenities. The schematic concept for these has been laid out, but funding is needed to complete design and begin phased construction.

Applicant: Dorchester County
Project: Woods Road Project
Amount: \$1,192,748

The Woods Road Project consists of improvements and upgrades (culvert replacement and drainage), repaving and striping on Woods Road from the circle on Route 16 to Route 50 (.08 Miles). The railroad that feeds Woods Road was permanently shut down in May 2016 causing increased truck traffic without enough room to turn safely at Interstate Container (now DS Smith). The business was able to rearrange traffic flow onsite after the rail closure, but the main road has not been improved. Interstate Container was attracted to Cambridge because it had a rail system that could carry their heated material and deliver onsite. Since then, Protenergy (across the street) has expanded twice and may expand again in the near future. They employ 280 people and have increased production. Water infrastructure was added to Woods Road for their expansion.

Applicant: Chesapeake College
Project: Future Works Workforce Training
Amount: \$257,500

This \$257,500 investment from Dorchester County – together with \$875,500 in Rural Maryland Economic Development Funds from the other four counties – would provide the gap funding needed to fully expand an existing trades program, kick-start a new trades program, help staff a new Center for Innovation and Entrepreneurship, and provide support to non-credit students.

Applicant: Chesapeake College
Project: CDL/Class B Expansion to Dorchester County
Amount: \$338,085

New Federal Motor Carrier Safety Association (FMCSA) regulations require all new Commercial Driver's License (CDL) candidates to complete an approved training program to receive their certifications. Chesapeake College is one of only 3 approved training facilities on the Eastern Shore; the other facilities are located at Cecil Community College and WorWic Community College. The demand for the College's CDL program in Wye Mills is out pacing enrollment capacity. Currently students interested in obtaining a CDL are registering for classes offered 9-12 months out. As a result, potential students, including local government agency employees who need this training (county roads, school bus and various municipal agencies), are severely

impacted. A 9-12 month wait for training could create a public safety issue, as well as a service issue. By adding an auxiliary training location for Class B-specific CDL licensing in Cambridge/Dorchester County, Chesapeake College can significantly reduce wait times for classes to a more reasonable 1- 3 months for municipal workers in Dorchester and other county governments, as well as relieve the pent-up demand among students across the mid-Shore and possibly beyond. Internal data from the College, as well as external data from JobsEQ supports that CDL certification is a growing and popular program in Dorchester County and on the Eastern Shore of Maryland.

Applicant: Upper Shore Workforce Investment Board
Project: Incumbent Worker Training
Amount: \$50,000

Incumbent Worker Training is designed to help existing businesses train incumbent workers to allow them to gain a promotion, expand into new markets, or simply retain them. The current workforce is very dynamic now and Dorchester County employers need help keeping their key staff and IWT can be an effective tool to invest in their own employees. Training funds from our standard WIOA or ARPA typically cannot be used for incumbent workers due to the inability to qualify them with the restrictions on these grants.

Applicant: The Town of Vienna
Project: Edwin Murphy Community Purchase
Amount: \$155,000

The Town of Vienna would like to gain ownership of 104 Race Street located in the Town of Vienna. The property is currently owned by The Vienna volunteer Fire Company, Dorchester County and is currently for sale. The Town would like to purchase and demolish the building to create additional parking space for our boating traffic and waterfront events. Our concern is that the building will be purchased to be used for a purpose not in line with the vision of our community and surrounding neighbors. We envision a parking lot with bathroom facilities that can bring additional events and vendors to highlight our beautiful waterfront. Past events have caused traffic and parking issues along the narrow streets and with neighbors. We feel that this project is in the best interest of the town.

Talbot County - 14 projects

Applicant: Chesapeake College
Project: Future Work Workforce Training
Amount: \$257,500

This \$257,500 investment from Talbot County — together with \$875,500 in Rural Maryland Economic Development Funds from the other four counties — would provide the gap funding needed to fully expand an existing trades program, kick-start a new trades program, help staff a new Center for Innovation and Entrepreneurship, and provide support to non-credit students.

Applicant: Maryland Broadband Cooperative, Inc.

Project: MidShore Optical Broadband Network Upgrade
Amount: \$240,000

This upgrade could benefit every Cooperative Member ISP operating in the region. We're asking for grant funds to help us keep pace with the growing needs of the MidShore. Costs for upgrading equipment, facilities, and service capacity in the three identified MidShore POPs is approximately \$240,000 per location.

Applicant: Eastern Shore Entrepreneurship Center, Inc. (ESEC)
Project: Talbot County Agbiotech Manufacturing Project
Amount: \$500,000

The proposed project initiates the development of an ag biotech manufacturing center in Talbot County. Agbiotech is the merging of agriculture and biotechnology, commercializing innovative solutions based upon biology rather than chemistry. Through its F3 Tech (Farm•Fish•Food) Accelerator, ESEC has seen a concentration of early-stage companies that fall under the category of agbiotech. For this reason, ESEC conducted a feasibility study that inventories regional assets and market opportunity in support of an ag biotech manufacturing center.

Applicant: The Town of Trappe, Inc.
Project: ENR Wastewater Treatment Plant Upgrade
Amount: \$500,000

Trappe is served by a 200,000 gallon per day Biolac wastewater treatment plant that was completed in 2003. Trappe is in the process of upgrading the treatment plant to an Enhanced Nutrient Removal ("ENR") plant. After the completion of this upgrade the Town will be able to offer additional sewer connections without increasing the Town's discharge permit capacity, which may include commercial and/or industrial properties located within Town limits that are not currently served with public water and sewer. The Town has identified infill areas along US Rt. 50 that are eligible for highway commercial mixed-use zoning the locations of which take advantage of the highway frontage and exposure. Property owners will be able to utilize Bay Restoration Fund money to connect to Trappe's wastewater treatment plant as it will meet the BRF criteria, which it currently does not, which will incentivize new businesses.

Applicant: Chesapeake Bay Maritime Museum, Inc.
Project: CBMM's New Visitor Center
Amount: \$300,000

The Chesapeake Bay Maritime Museum respectfully requests \$300,000 to support the completion of Phase II of our Master Plan. Developed in 2017, and recently re-envisioned, CBMM's Master Plan is an essential five-to-seven-year plan to enhance the visitor experience, further fulfill our mission, and contribute to Maryland's economic and community wellbeing. A recent economic impact report (Rockport Analytics Annapolis) indicated that visitors traveling specifically to visit CBMM from more than 50 miles generated \$11.6M in spending for Talbot County, and \$1.7M in state and local tax collections. The report is attached, which also emphasizes the extensive PK-12 and community programming services provided.

Applicant: Talbot County Free Library Association, Inc.
Project: Building Digital Literacy and Employment Skills at the Talbot County Free Library
Amount: \$22,000

The Talbot County Free Library (TCFL) is building on a series of initiatives, funded by grants -- begun at the outbreak of the pandemic -- that provide our rural community with improved access to, and training on, and use of, the internet and other digital library resources. TCFL has worked to provide improved access to the internet by building out wireless connectivity to the exterior of our two branches, increasing the number of circulating Wi-Fi hotspots, and creating a Wi-Fi Community Connection at a public park in Trappe. TCFL has also worked on marketing and training the public on using a wide variety of e-resources and training opportunities available from all public libraries on the Eastern Shore.

Applicant: Building African American Minds, Inc.
Project: BAAM Workforce Development Program
Amount: \$87,133

Building African American Minds (BAAM) Inc., is seeking funding in the amount of \$87,131.94 to assist with developing, implementing, and delivering a Workforce Development Program for adults, in particular those ages 18-30. Our program will focus on determining the participants' math, reading and writing levels as well as career/job skills interest to be able to develop an individualized plan for the participant and provide services and opportunities to enable the participant to reach their education and career goals.

Applicant: Talbot County Department of Economic Development and Tourism
Project: Inclusive Ventures Program
Amount: \$50,000

Talbot County Economic Development and Tourism is seeking funding for a training program to assist small, minority, woman, and veteran entrepreneurs with education, mentorship, and access to capital. The goal is to help these businesses maximize opportunity, create jobs, and grow the local and state economy.

Applicant: Talbot County Department of Parks and Recreation
Project: Frederick Douglass Park on the Tuckahoe Phase II Planning and Implementation
Amount: \$300,000

Redevelopment, Engineer, Architecture and Interpretation - \$300,000. Funds will be used to support Phase II of the Master Plan for the Frederick Douglass Park on the Tuckahoe to include planning and implementation of archaeological investigations at the site, engineering for overlooks, expanded trail network as well as restrooms.

Applicant: Talbot County Economic Development and Tourism
Project: Talbot County Economic Development and Tourism Strategic Plan
Amount: \$125,000

With a strong core of brick-and-mortar businesses and a wealth of professionals who make up "the creative class," Talbot County's vibrant economy is uniquely situated for continued growth.

The Department of Economic Development and Tourism seeks funding to develop a strategic plan for Talbot County, a plan that leverages past successes and takes the community to the next level as a destination both for businesses and visitors. An achievable, strategic economic

Applicant: Talbot County Government
Project: Goldsborough Neck Culvert Improvement
Amount: \$750,000

Talbot County is working to widen and improve Goldsborough Neck Road to support local businesses moving the Town of Easton's Industrial Park located on Goldsborough Neck Road. The culvert improvements will extend the existing pipes to allow Goldsborough Neck Road to be widened with 39 feet of pavement. By widening Goldsborough Neck Road and this culvert, existing businesses in the Towns of Easton and St. Michaels will have an alternative route that supports MSRC Rural Maryland Economic Development Fund Application 19 heavy-duty tractor trailers, buses and farm equipment. In addition to the existing businesses, the proposed road improvements will support new businesses moving to the Industrial Park developed on land owned by the Town of Easton.

Applicant: Talbot County Department of ED and Tourism
Project: Talbot County Visitors Center Feasibility Study
Amount: \$38,700

Talbot County's location at the epicenter of the newly designated Chesapeake Country All-American Road gives an urgency to this request. U.S. Route 50 forms the spine of this internationally significant byway as it passes through Talbot County. Co-locating on the property alongside the Talbot County Community Center or the Easton Airport seems to make sense from a practical standpoint. A feasibility study will help the Talbot County Council understand the capital investment and operational considerations required for such a project.

Applicant: Oxford Community Center, Inc.
Project: The Work Hub
Amount: \$13,000

The Oxford Community Center is a prime commercial facility to serve workforces of many kinds. With existing high-speed internet, new surround sound audio system, breakout rooms, outdoor platforms, large presentation screen, stage, podium and a commercial kitchen, the OCC is a high-service business hub. But it needs an upgrade in hybrid technology and live streaming AV capabilities. The demand for these technical services has increased since Covid and is the new standard for all business meetings.

Businesses from sole proprietors to industry conferences, hybrid options for participants are a must.

Applicant: Classic Motor Museum of St. Michaels, Inc.
Project: Automotive Technician Apprenticeship Program
Amount: \$50,000

There are no automotive technician education programs for adults on the eastern shore of Maryland. Aspiring automotive technicians from Maryland's eastern shore must either commute

to Catonsville Maryland (Community College of Baltimore County) or Georgetown, Delaware (Delaware Technical Community College) to attend classes and labs, or move to Cumberland, Maryland (Allegany College of Maryland) to receive such training. This lack of education and training means that local automotive repair shops cannot find qualified technicians to hire. The Classic Motor Museum's volunteers, along with many others in the automotive industry on the eastern shore, believe that the lack of automotive will not abate until there is an intervention to change the dynamic.

Tri-County Council Lower Eastern Shore

Somerset County	1 project	\$ 3,300,000
Wicomico County	1 project	\$ 3,298,333
Worcester County	7 projects	\$ 3,299,333
Administrative expenses		\$ 102,334
Total		\$10,000,000

Somerset County

Application: Board of County Commissioners for Somerset County Maryland
Project: Somerset County Industrial Park
Amount: \$3,300,000

The Somerset County Commissioners, in consultation with the County Economic Development Commission, proposes developing an industrial attraction site that will allow the county and the state of Maryland to market to firms looking to expand in the Mid-Atlantic. The current industrial park in Princess Anne is nearly full. Several years ago Wal-Mart explored development at the proposed site. The county and state invested in site area upgrades including a traffic light at the intersection with Route 13 and a water tower. Recently Chesapeake Utilities has extended natural gas to the adjacent property – ECI. The project will acquire approximately 175 acres of developable land in the County's Priority Funding Area, complete a site evaluation to include wetland and forest delineation and survey of the developable portion for a single or multiple site, extend utilities to the site, and produce marketing materials to be used to educate site selection consultants. The anticipated land acquisition cost is \$1.5 Million, with almost \$2.0 Million budgeted for site preparation and extension of services. Discussions with real estate professionals have garnered positive feedback, as most firms currently want to have a quick development timeline but prefer building to their own needs. This project would allow Somerset to compete for large scale projects that need a ready to build site with access to water and sewer, fiber, natural gas, and highway access. Discussions show that likely tenants would employ approximately 250 workers in a facility up to 450,000 square feet, and total investment in the property would be between \$10 and \$50 Million.

Wicomico County

Applicant: Salisbury-Wicomico Economic Development Inc.
Project: Salisbury-Wicomico Regional Airport Growth and Development

Amount: \$3,298,333

The purpose of this project is to provide a comprehensive approach to retain and enhance scheduled airline service for our region, grow the aviation and aeronautical sector for a more diverse and sustainable economy, create a pipeline of talent for area employers in general and Piedmont Airlines (dba American Eagle) in particular, offer a pathway to meaningful job opportunities, retain, and increase jobs and plan for future development at the Salisbury-Ocean City Wicomico Regional Airport (SBY). This purpose is accomplished by (1) establishing an FAA Part 147 Certified Aviation Maintenance Technician (AMT) program at SBY, (2) developing a strategic plan for SBY and (3) creating shovel-ready site(s) at SBY for future development. Wicomico County owns and operates the Salisbury-Ocean City Wicomico Regional Airport. With its headquarters and a large maintenance operation based at SBY, Piedmont Airlines, a wholly owned Tri-County Council for the Lower Eastern Shore of Maryland 4 | Page Rural Maryland Economic Development Fund Application subsidiary of American Airlines, offers scheduled airline service to approximately 120,000 passengers annually to and from Philadelphia International and Charlotte Douglas International airports. The University of Maryland Eastern Shore (UMES), an HBCU located in Somerset County, Maryland offers the only four-year degree in aviation science coupled with a pilot training program in Maryland. This project adds another component to UMES' offering as the school will operate the AMT program at SBY. Combined, this partnership between Wicomico County, Maryland, UMES, Piedmont, and other industry partners, establishes a robust workforce development initiative that is perhaps unparalleled anywhere else in the country and will help drive future development at SBY.

Worcester County – 7 projects

Applicant: Worcester County Government
Project: West Ocean City Commercial Harbor Dredging
Amount: \$275,000

Supplemental dredging of the West Ocean City Commercial Harbor to eliminate scattered shoaling causing issues with larger commercial and recreational vehicles needing additional draft clearance to load/unload, navigate, and dock. Clearing navigational obstacles has an enormous local impact to dozens of waterfront and marine-dependant businesses including marinas, commercial seafood processors and suppliers, commercial and recreational fishing, restaurants, boat repair/diesel engine contractors/electronic services, barge/ship/yacht dockage, and 1,000's of recreational boaters.

Applicant: Worcester County Government
Project: Worcester Main Street Connectivity
Amount: \$800,000

The proposed project would provide fiber optic service to the main street areas in Berlin, Snow Hill, and Pocomoke City and surrounding areas to allow small rural businesses the same access to fiber as any other major city. The county would run buried conduit throughout the areas allowing for every home and business to have fiber service with no large up front install fee. The conduit would be co- owned by the county allowing the county to utilize the network for any future expansions of their network or any new ideas this network can provide. This could include camera

systems, Wi-Fi for towns, internet for special events, etc. This project is a plan to build infrastructure that will help these towns for generations to come, and as new technologies emerge the county will be able to use this conduit to keep up with the changes.

Applicant: Worcester County Government
Project: Riddle Farm Wastewater and Water Plant Optimization
Amount: \$1,719,333

Upgrade of WWTP membranes to add capacity and maintain effective operation of the plant. Project also involves lowering of the water tower to be compatible with neighboring water systems for finalization of interconnections to add capacity and provide for redundancy, reliability, and resiliency in the use of the local water supply resources.

Applicant: Worcester County Government
Project: Northern Regional Water and Wastewater Engineering and Design
Amount: \$205,000

Engineering and design services to facilitate expansion and interconnection of Mystic Harbour and Riddle Farm water systems. Engineering and design services will also plan for construction of an interconnection between Mystic Harbour and Riddle Farm treated effluent storage ponds to take advantage of land application capacities in each service area to utilize treated effluent as reuse irrigation. This interconnection helps provide a stable land application area and storage that would be very costly to new commercial customers to recreate and construct within these service areas. Engineering and design services will also be done for water and wastewater infrastructure improvements to Rt. 589 commercial corridor to provide for growth and stable delivery of sanitary services to the Ocean Pines regional area.

Applicant: City of Pocomoke City
Project: Pathways to Economic Development
Amount: \$100,000

Over the several years the city has explored infrastructure improvement in the areas of using bikeways, walkways, and pathways to bolster economic growth. Creating strong pathways leads to positive economic impact. This project will focus on three main factors: Infrastructure Feasibility (hardscape and environmental), Economic Development, and Intercommunity Connectivity. Infrastructure Feasibility would include the best places to build bikeways, walkways, and pathways with the least environmental impact and the most economic impact. This would include hard scapes that are complementary to the native landscaping features in our city and their cost factors. Economic Development Factors would evaluate the scaling of infrastructure development and how it would directly impact business foot traffic, revenue bases, including tourism dollars. This would include events and activities using the proposed infrastructures and the administrative capacity required to oversee these changes.

Applicant: City of Snow Hill
Project: Snow Hill - Bikeways Project
Amount: \$100,000

Establishing a “greenway connectivity network” to connect commercial districts and strategic points of interest throughout Snow Hill has been a goal identified in Snow Hill’s Comprehensive Plan since 2010. Similarly, paths and rails, and increased Wayfinding signage are strongly suggested in our 2025 Strategic Revitalization Plan, and throughout our Nature and Heritage

Tourism Assessment. To implement the development strategy of connectivity, the Town of Snow Hill contracted with Toole Design Group, LLC (Silver Spring, MD) for a Bikeways Feasibility Study. Their final report identified a 3-mile loop connecting key destinations in town that will provide safer, more convenient, and enjoyable biking for residents and visitors. Connecting to longer distance routes and opportunities for biking, The Snow Hill Bikeways Project will be the central link to various bikeways plans being developed by neighboring communities, positively impacting tourism, and economic development of the Town. Economic impact studies by the Rails to Trails Conservancy show a correlation between trails and increased property values, business development, quality of life, and tourism.

Applicant: Lower Shore Land Trust
 Project: Lower Shore Trails and Greenways Connections
 Amount: \$100,000

This project would provide for a coordinated effort to enhance transportation infrastructure that would achieve economic and community benefits for all three counties in line with the objectives of the Rural Maryland Economic Development Fund. Cross marketing of existing bike, walk, and run events and safe places to walk and ride would have short-term results attracting tourists and businesses. Investing in collaborative planning and feasibility studies to create a connected regional greenway and trail network improves success in applying for state and federal funding to build the infrastructure. This would have a long- term economic impact for the Lower Shore as has been demonstrated by trail projects across the country.

Tri County Council for Southern Maryland

Calvert County	4 projects	\$ 2,478,000
Charles County	8 projects	\$ 2,007,000
St. Mary's County	8 projects	\$ 2,470,000
Regional	4 projects	\$ 282,400
Tri-County Council	7 projects	\$ 2,556,400
Administrative expense		\$ 206,200
Total		\$10,000,000

Calvert County - 4 projects

Applicant: Calvert County
 Project: Feasibility study for Open Air Pavilion
 Amount: \$60,000

Calvert County would use the results of the proposed Open Air Multi-Use Pavilion Feasibility Study and Schematic Design to issue a bid to permit and construct a 60 ft x 175 ft. multi-use, open structure with extended roof overhang, concrete floor (Includes 24' x 60' area for bathrooms and commercial kitchen.) The pavilion would serve as a centrally-located, focal point for a walkable community in the Prince Frederick Town Center, and complement the new Armory Square development. The location would provide a visible farmers market and support events for residents and the business community and other tourism-supporting activities. It would also include a grassy area around the pavilion for community events and gatherings.

Applicant: Calvert County
Project: Bay Bridge Passenger Ferry Feasibility Study
Amount: \$18,000

The Bay Bridge Passenger Ferry Feasibility Study was submitted for an EDA Planning and Local Technical Assistance Programs (EDA-PHI-TA-PRO-2021-2006851) grant submitted by Visit Annapolis & Anne Arundel County on behalf of the consortium of participating counties. The total 50/50 matching grant is \$250,000. For the \$125,00 matching funds, MEDCO pledged \$25,000 for the project and the participating counties will be covering the remaining \$100,000. Grant seeks \$18,000 for Calvert County's portion of the matching funds.

Applicant: Calvert County
Project: Open Air Multi-Use Pavilion Permitting and Construction Project at Armory Building Site in Prince Frederick Town Center
Amount: \$2,000,000

Calvert County would use the results of the proposed Open Air Multi-Use Pavilion Concept Plan Feasibility Study (also requested through the Maryland Rural Investment Fund) to issue a bid to construct a 60 ft x 175 ft. multi-use, open structure with extended roof overhang, concrete floor (Includes 24' x 60' area for bathrooms and commercial kitchen.) The pavilion would serve as a centrally-located, focal point for a walkable community in the Prince Frederick Town Center, and complement the new Armory Square development. The location would provide a visible farmers market and include a grassy area around the pavilion for community events and gatherings. The multi-use, open air facility would serve as a home for a centrally-located Calvert County Farmers Market, community events during off-market days, promote visitation/tourism, create opportunities to stimulate business activity, and maximize the variety and nature of events capable of being hosted to optimize utilization, including a winter ice skating rink.

Applicant: Calvert Economic Development
Project: Armory Square
Amount: \$400,000

Armory Square is a comprehensively planned retail and medical office project planned for the Prince Frederick Town Center. It is a redevelopment at the former Calvert Middle School property at 435 N. Solomons Island Road, Prince Frederick MD 20678. The project is expected to result in 125,000 square feet of new commercial space, 450 jobs and an estimated \$325,000 in annual property taxes.

Charles County - 8 projects

Applicant: United States Bomb Technician Association (USTBA)
Project: Equipment for labs at the USBTA
Amount: \$267,000

The lab equipment is needed in the seven labs at the newly opened USBTA Bomb Disposal Technology and Training Center located at the Maryland Technology Center (MTC) in Indian

Head in order to perform the USBTA mission and to facilitate the collaborative efforts that serve the strategic industry sector of public safety and defense including: Research, Development, Testing, and Training at the Bomb Disposal Technology and Training Center at the Maryland Technology Center in Indian Head MD. This lab equipment will outfit the USBTA's workforce training facility and multiple labs to include: Wet lab, Woodshop, Machine/metal shop, Electronics lab, 3-D printing lab, and a computer lab.

Applicant: Charles County Economic Development
Project: Maryland Technology Center (MTC) Buildout Expansion for USBTA
Amount: \$550,000

Funding for expansion and buildout at the MTC will allow the United States Bomb Technician Association (USBTA), a 501c(3) membership association, to respond to the economic and workforce development demands of a strategic industry sector - public safety and defense – through an expansion of its current facility (which is 13,000 sq ft) to a 29,000 sq ft building used for research, testing, and training. The USBTA is a 501c(3) membership association with a mission to work collaboratively with industry, government, and academia to equip public safety personnel and bomb technicians with the best training and tools available through innovation and collaboration. USBTA has a 10-year lease with two five-year options to manage and operate the MTC, for a total of 20 years from building owner Triumph Development.

Applicant: Charles County Government
Project: Mallow's Bay National Marine Sanctuary Visitors Center Feasibility Study
Amount: \$350,000

Funding to determine the possible building configurations, management scenarios and site options for a Mallovs Bay, National Marine Sanctuary Visitors Center which has regional, state, and national significance. This request includes operational expenses and programmatic personnel costs associated with the study.

Applicant: Charles County
Project: Waldorf Urban Corridor Streetscape Project
Amount: \$175,000

Charles County is requesting funds for a Waldorf Urban Redevelopment Corridor (WURC) streetscape project to assist with attraction and retention businesses in the WURC corridor while larger redevelopment plans are underway.

Applicant: Charles County Government
Project: Create Charles County: Advancing Arts, Culture & Community
Amount: \$275,000

Charles County is requesting funds for the development of an Arts and Culture Master Plan. The master plan will guide the county on how to direct resources and ensure arts and culture is an integral part of the Charles County community in the future. The master plan will reflect the community's desire to utilize public arts and culture to enhance the sense of community;

contribute to economic vitality; create and support an environment where public art and culture thrive; and enrich the community culturally, aesthetically, educationally, and economically. This request includes operational expenses and programmatic personnel costs associated with the master plan development.

Applicant: Charles County Government
Project: Popes Creek Waterfront Park Engineering and Design
Amount: \$165,000

Charles County requests funding for engineering and design of Open-Air pavilion at the county owned Popes Creek Waterfront Park. This pavilion will be utilized by residents, visitors, and other tourism supporting activities. This request includes operational expenses and programmatic costs associated with the engineering design.

Applicant: Charles County Government
Project: Esthetic Improvement Project - Crain Memorial Welcome Center
Amount: \$175,000

The goal of this project is to work with vendor/ design specialists to develop and execute a concept plan for the facility. The objective is to reimagine and enhance the in Charles County. The brochure furniture is worn and dated and does not effectively showcase the different size brochures to visitors. A goal of this new plan will be to secure brochure furniture that will accommodate all brochure sizes and showcase the name of the county allowing visitors to view them from a distance.

Applicant: Charles County Melwood Horticulture Training Center
Project: Building Paths
Amount: \$50,000

The purpose of the program is four-fold: 1) to assist participants to learn the soft and hard skills needed to obtain and retain employment, 2) to provide employers with a ready funnel of workers, 3) to assist participants to enter an apprenticeship program, and 4) to address the limited educational opportunities available to people with disabilities.

Building Paths also addresses many compliance requirements and community needs and ensures compliance with federal mandates that state training is linked to an in-demand industry or occupation that leads to economic self-sufficiency and encourages the attainment of postsecondary credentials.

St. Mary's County - 8 projects

Applicant: St. Mary's County Economic Development
Project: Lexington Park Development District Implementation Plan
Amount: \$100,000

This project will utilize consultant services to develop a Plan of Action for implementing the adopted Lexington Park Development District (LPDD) Master Plan. The Comprehensive Plan calls for locating 80% of the County future growth on the 20% of County land that is designated

for growth areas. The LPDD Plan anticipates that 70% of that growth area development will be located in the Lexington Park Development District. A first step in assuring Lexington Park is able to accommodate the planned intensity of development, is providing specific implementation strategies to create an attractive physical environment that helps existing and infill businesses attract customers and talent, to enhance quality of life for existing and future residents so that Lexington Park becomes the primary destination for locating homes, employment, and services within the Calvert-St. Mary's MPO. Short term outcomes will be streetscape enhancements to activate downtown and gateway, the crafting of a façade improvement program, and addressing factors that help increase resiliency of Naval Air Station Patuxent River.

Applicant: St. Mary's County Government
Project: St. Mary's Regional Airport Public Space Enhancements
Amount: \$380,000

Create public gathering spaces for further activation of the regional airport and emerging AeroPark Innovation District as an attractive location for continued growth in general aviation, aviation related enterprises, and charter service for Southern Maryland and as the physical headquarters for Southern Maryland Innovates. Create a flexible and programmable center providing a variety of active and passive experiences increasing activation and promoting growth and collaboration within the regional airport district. The effort will encourage interaction of those within the aviation and aeronautic industries, pilot population, academia and research organizations all within the district footprint as well as draw residents and visitors to the site.

Applicant: St. Mary's County Economic Development
Project: St. Mary's County Urban Legacy Plan Development
Amount: \$60,000

Create an Urban Legacy Plan through stakeholder engagement, with priority funding areas and mechanisms for compliance. An Urban Legacy Plan is designed to enhance resiliency of NAS Pax and increase confidence of businesses in the Calvert-St. Mary's MPO.

Applicant: Maryland Economic Development Corporation (MEDCO)
Project: UAS Strategy and Roadmap for the State of Maryland
Amount: \$80,000

St. Mary's Department of Economic Development plans to support the Maryland Economic Development Corporation (MEDCO) project to help define the investment, stakeholder engagement, and strategic vision and plan that positions Maryland to capture the tremendous economic and societal benefits potential autonomous technologies offer to the region. This project will inform MEDCO's efforts to help attract industry to the region, test and operationalize use cases, and foster innovation district and "place-making" development efforts to create economic impact.

Applicant: St. Mary's County Economic Development
Project: The Barns at New Market Capacity Enhancement
Amount: \$550,000

Install BAT (best available technology) to accommodate production of high fat food processing

and expansion of existing parking. Market is a destination and prime retail location for producers in St. Mary's, Charles and Calvert.

Applicant: University of Maryland College Park
Project: Chesapeake Bay UAS Route Network (CURN) Phase II
Amount: \$800,000

The goal is to create an FAA- approved UAS route network overlying the Chesapeake Bay that supports future research and development, government/civil/commercial operations, and public safety. Phase 2 will be an implementation phase that includes the execution of the various action plans developed in Phase 1. Examples of the various action plans to be executed include the detailed phased implementation of operational requirements, communication, marketing, staffing, business/financial, and service support supplier acquisition plans. Phase 2 will implement the infrastructural foundation to the route network to support Southern Maryland and the entire Bay watershed to begin routine operations. The completion of Phase 2 will allow the route network to become scalable to support other regions in Maryland.

Applicant: University of Maryland College Park
Project: Chesapeake Bay UAS Route Network Phase I
Amount: \$500,000

The goal is to create an FAA- approved UAS route network overlying the Chesapeake Bay that supports future research and development, government/civil/commercial operations, and public safety. An FAA approved UAS route network will allow for easy transport of goods across the bay, will increase UAS research and development, and will bring recognition to Southern Maryland as a leader in the UAS field. Phase 1 will be a planning phase that includes developing all necessary action plans required to lay the infrastructure foundation to implement the route network to support the Southern Maryland and the entire Bay watershed. Examples of the various action plans to be developed include a detailed phased implementation of operational requirements, communication, marketing, staffing, business/financial, and service support supplier acquisition plans

Tri-County Council - 7 projects

Applicant: Southern Maryland National Heritage
Project: Southern Maryland NATIONAL Heritage Area Project
Amount: \$420,000

The Southern Maryland National Heritage Area initiative began several years ago as the potential for becoming a National Heritage Area became an important focus of this state based heritage entity. All aspects of this project are community and partnership driven. Numerous public forums were held, and the Feasibility Study required by the National Park Service and by the national legislation was formulated, circulated, and launched for community review and input. The Feasibility Study was then approved by the National Park Service, which allowed legislation to move forward. The legislation has now passed the United States House of Representatives and is pending a vote in the United States Senate. It is important to note that this is a bipartisan initiative, and there were no objections to the legislation from either party as it passed through committees. The requested funds would allow for the maximum impact to be gained from the initial designation: launching a national media campaign, hosting an in-person launch, creating

the marketing needed to define and promote the new National Heritage Area, and allowing the process of a management plan to begin immediately.

Applicant: The College of Southern Maryland
Project: Vertical Agriculture and Sustainable Food Systems
Amount: \$490,000

The College of Southern Maryland's implementation of a vertical agricultural training program for a sustainable food systems workforce will introduce seedling and food production with limited space and resources. Students will be trained to understand and operate a scalable vertical agriculture system with controlled environment and applied science. This system utilizes water and technology and allows the incorporation of devices to take advantage of renewable/green energy sources for its electric energy consumption. Workforce development around food production technologies opens the door to contributing to a struggling food supply chain without access to space or tillable land. The proposed system does not use robotics and offers simple maintenance and repair solutions, adding yet another level of skill development and training. The Tri-County Council for Southern Maryland is seeking funding of \$490,000 to purchase and provide CSM with a 10-rack vertical agricultural system for the development of a sustainable food systems workforce development program to take place between the classroom and partnering farm. This funding amount includes technology acquisition and installation, curriculum development, participant training, and instructional cost for two years.

Applicant: The Boards of Education in Calvert, Charles, and St. Mary's
Project: Virtual Reality Career Exploration
Amount: \$30,000

Virtual Reality (VR) Career Exploration creates classroom-to-career pathways, training the current and next generation of workers for well-paying jobs across every industry via hands-on, simulated training that teaches critical skills for in-demand jobs. As an economic development engine, this platform helps create better futures for students, workers, employers, and the communities that they call home, in turn strengthening the local economy. Teachers and students will be surveyed to determine levels of satisfaction with the technology. Survey results will be utilized to determine if this technology will be used by the Workforce Development Board in conjunction with Policy Area 3 of The Blueprint for Maryland's Future which was passed by the 2021 Maryland General Assembly session and now serves as the Maryland State Department of Education's driving force for making significant and lasting changes in its transformation to a world-class instructional system to improve the overall quality of education in Maryland. Policy Area 3 outlines the College and Career Readiness (CCR) standards which include the directive that Local Workforce Development Boards provide career readiness services to students in middle school.

Applicant: Tri-County Council Workforce Development
Project: Returning citizens
Amount: \$125,000

This project will provide Southern Maryland individuals who have been incarcerated the mentoring, training, services, and support they need to find jobs, establish career paths, and successfully reenter society. This proven concept was evaluated with positive results several years ago when we established a Calvert County reentry program at the detention center in Prince Frederick. We funded staff and equipment for space in the detention center to work with released individuals still in case management with the Department of Corrections to aid them

with the training and employment services needed to successfully reenter. When our federal Workforce Innovation and Opportunity Act (WIOA) funds were drastically cut for FY21, this work was placed on hold. Funding for this initiative will allow us to continue our operations in Calvert County and develop similar programs in Charles and St. Mary's Counties for two years. We will blend these funds with other state and federal funds to provide skills upgrades for eligible individuals, and will utilize SkillUp Southern Maryland, a training platform purchased by the Tri-County Council for Southern Maryland's Workforce Development Board that provides free access to over 5,000 courses from Skillsoft, a nationally recognized training provider of workplace, business, technical and IT courses. Returning citizens will be assisted in completing a self-assessment of their skills, identifying any skill gaps, and receiving training to remediate those gaps.

Applicant: College of Southern Maryland
Project: Certiport Entrepreneurial Certification Program
Amount: \$55,200

The College of Southern Maryland (CSM) is approved by Certiport to provide this training and administer the certification exam. Funding of \$55,200 from the Rural Maryland Economic Development Fund will enable 40 individuals over a two-year period to complete this training and become ESB certified. Entrepreneurship and Small Business (ESB) is a certification from Certiport, sponsored by Intuit and the Network for Teaching Entrepreneurship, which ensures tomorrow's leaders are prepared with the toolkit they need to get ahead in today's competitive landscape. Whether one is starting a bakery or launching the next billion-dollar startup, ESB validates a student's understanding of core business principles, including the essentials needed to launch and maintain a successful business. Candidates for ESB certification will be expected to have key conceptual knowledge of entrepreneurial and small business principles through at least 150 hours of instruction. It is not required for students to have real-world experience as a small business manager in order to take and pass the exam. Successful completion of this certification will validate the skills and knowledge for those students interested in working in a middle-skill trade profession as their own boss and those with entrepreneurship and small business career aspirations. Through Certiport's full pathway solution students can prepare for the ESB certification with tailored learning materials, practice tests, and a performance-based certification exam sponsored by Intuit and officially endorsed by The Network for Teaching Entrepreneurship (NFTE).

Application: Rural Agricultural Center
Project: Equipment Purchase for Rural Agricultural Center
Amount: \$1,401,200

The latest cost projections tabulated for RAC construction were tabulated in December, 2021 in time for the execution of the latest Memorandum of Understanding (MOU) between the TCC/SMADC and St. Mary's County.

The final construction estimate for the RAC is \$4.7 million inclusive of a 10% (\$470,000) contingency. Since that time according to Mortensen Non-Residential Buildings national average, construction costs inclusive of materials and labor, have increased as much as 16% in 2022. With the year-to-date inflation index hovering around the 9% mark, those construction increases show no indication of declining. (And certain costs, for instance steel materials, are posting increases near 100%.) Should the maximum amount of potential increase be factored into the 2023 construction costs for the RAC, a total cost increase of \$752,000 could be expected over the 2021 estimate. As there is already a \$500,000 contingency built into the current estimate, if construction were to take place in 2022, an additional \$252,000 in funds would be appropriate. As the construction will not commence until 2023, it

would be prudent and proactive to increase that among and to assign additional funding up to a total of \$500,000 to the project. If the \$500,000 contingency were not required, all remaining funds from the allocation would be re-tasked to another RAC project, the Cold Storage. The Cold Storage project is currently funded with a \$200,000 grant from the State of Maryland to be of benefit to the produce farmers of Southern Maryland for product storage and aggregation. With construction costs of a Cold Storage facility running a current average of \$250 square foot, any money not used for RAC contingency would be utilized to expand the existing footprint.

The primary mission of the RAC is to provide world-class, state-of-the-art meat processing to the livestock producers of Southern Maryland. This list of equipment is inclusive of receiving USDA inspected carcasses from the local Westham Butcher Shop, methods in inhouse conveyance, cutting room equipment, grinders, sausage makers, smokers, warming boxes for charcuterie, kettles for scrapple and bone broths, sanitization equipment, scales, packaging equipment and more. Another essential RAC component is the Instructional/Commercial kitchen with cooking, holding, and freezing equipment necessary to support a growing cottage food industry requiring commercial standards, as well as a place to teach food creation.

Applicant: Rural Agricultural Center
Project: New Generation Point of Sale software system
Amount: \$35,000

One of the basic functions of the RAC is to market, aggregate, and distribute SMM products to a wider audience and expand its market penetration into convenience driven venues competitive with commercial foods. This proposed labeling and information system would provide the consumer in these new venues with state-of-the-art appealing graphics, and also vital information about this locally produced product. The consumer can literally get to know the farmer and processor, one of the necessities to support the

Buy Local movement. The proposed system will facilitate the following:

- Promote Quality Products: The origin and quality of fresh, locally sourced, meats are often hard to determine, causing consumers to discriminate solely on price. With this system, vendors can distinguish their products by telling the full story and allowing consumers to make more informed decisions.
- Increase Transparency: By storing information on the producers and foods at each step of the supply chain, consumers can be confident of the origins of their food. This system's tracking system allows consumers to quickly scan a product and learn about the producer, their farming practices, and how their food was handled and processed.
- Increase Food Safety: Foodborne illnesses continue to be a significant risk to the public and challenge to producers and processors. By tracking product origins and farming practices, this system allows for quick identification of the source of a foodborne pathogen so that unsafe products can be removed from the marketplace without destroying large amounts of safe products.

- Facilitate Transactions: This system allows players in the food chain to transact directly via smart contracts. Powered by the blockchain, this solution facilitates innovative contracts between all parties. Seller and buyers can both feel confident in transacting in a smoother and safer environment. This request for funding will be used to purchase the required touch screen computers, an automated weighing, wrapping and labeling station and purchase development and support from the maker of the FoodToken system described in this Proposal.

Regional projects - 4 projects

Applicant: Tri-County Council
Project: Southern Maryland Blue Catfish Feasibility Study
Amount: \$75,000

Funding for feasibility study to determine if Blue Catfish harvest is a sustainable and competitive sector for southern Maryland that would contribute meaningfully to job creation, economic development, sustainable livelihoods and food security for the region and development market analysis and gap identification to support this venture.

Application: Tri-County Council
Project: Software purchase - Revista
Amount: \$7,700

Purchase a three-year subscription for three users (one for each county) to access Revista, a medical real estate software. Revista would allow the Southern Maryland region to gain a competitive advantage for a targeted industry by providing data that supports new business development, underwriting, portfolio maintenance and investment strategy. This software also allows the user to access medical needs by specialty area in their community. Funding this request would allow all three economic development offices to access this software for the length of the contract. Users can create reports to share with clients. **Cost Breakdown:**

· One region with 3 users is \$4,200 one year. · For 2 Years, \$3,500 year one and \$3,900 year two (\$1,000 savings) Total: \$7,400 two years · For 3 years, \$3,500 years one and two and \$3,900 year 3 (\$1,700 savings) Total: \$7,700 three years.

Application: Tri-County Council
Project: Agriculture & Aquaculture Infrastructure Gap Identification Study
Subject: \$75,000

Analytical asset mapping, infrastructure gap identification and market analysis to support agriculture and aquaculture value chain in St. Mary's, Calvert and Charles.

Application: Tri-County Council
Project: Bicycle Wayfinding Design
Amount: \$125,000

Feasibility Study * Updated * Plan, design, manufacture & install bike route and wayfinding signage for the St. Mary's, Calvert and Charles mapped routes.

Upper Shore Rural Council

Cecil County	3 projects	\$ 2,863,000
Kent County	3 projects	\$ 2,863,000
Queen Anne's County	11 projects	\$ 2,863,000
Regional	8 projects	\$ 1,261,000
Administrative fee		\$ 150,000
Total		\$10,000,000

Cecil County - 3 projects

Applicant: Cecil County Administration
Project: Belvidere Road Improvement Project

Amount: \$1,980,000

This is a major economic development project as Belvidere Road will become a main thoroughfare for trucks and employees servicing our largest commercial/light industrial hub that is Principio Business Park (1,600 acres). Belvidere Road traffic is expected to increase from 2,400 to 18,400 vehicles per day when the new interchange opens in 2025. This project will support existing and continued development of businesses on Belvidere Road and Rt 40, including, but not limited to, Principio Business Park. Also, the business park is served by a publicly accessible rail spur with potential for one or two additional spurs being built, which would increase traffic. This project will also reduce truck traffic volumes and improve service flow on Rt 222 and Rt 272, the interchanges to the west and east of the new Belvidere Road interchange.

Applicant: Cecil County Council

Project: Cecil County Farm Museum Regional Ag. Center

Amount: \$150,000

Facility located on the Cecil County School of Technology property. Partnership with the Cecil County School of Technology's culinary program. Culinary students will be involved in designing the kitchen, creating inventory lists for kitchen, and preparing meals and serving CCPS students participating in ag education programs at the CCFMRAG; CCFMRAG has a working partnership.

Applicant: The Paris Foundation

Project: Paris Foundation Community Center

Amount: \$733,000

Project Summary: The Paris Foundation has committed to building a 10,000 sq ft multipurpose community center in the heart of Cecil County's most impoverished neighborhood. Upon it's completion, 300 families within walking distance, as well as those arriving by public and private transportation, will be able to enjoy a nightly community meal, receive free medical treatment, job training and placement, focused on a Food Service Industry Training Program: ServSafe Food handlers Certification Program, Life Skills, and Job Match link to area employers. The facility will consist of a commercial kitchen, buffet serving area, dining room, auditorium, classrooms, and conference rooms.

Kent County – 3 projects

Applicant: Kent County Commissioners

Project: Worton Service District Water & Sewer Extension

Amount: \$1,532,000

The extension of water & sewer mains into the planned industrial zoned service area so can be utilized for business development. The proposed project will design and construct approximately 4,405 feet of 8 inch water main and 8 inch gravity sewer along Route 297 from the Humane Society location currently under construction to and along Mary Morris Road to the railroad crossing. A new wastewater pump station on Mary Morris Road will pump wastewater through a 4 inch force main back to the existing sewer system. The Worton wastewater treatment facility has a design capacity of 250,000 gallons per day and is operating at 70,000 gallons per day.

Applicant: Town of Millington

Project: Millington Wastewater Treatment Facility

Amount: \$1,081,000

Economic and Tourism Development have worked with many businesses and developers and many properties along US 301 have been under contract only to not make it to closing due to lack of infrastructure. Upgrading the Millington Wastewater Treatment Facility will enable the County and the Town of Millington the capacity to grow and expand current businesses and attract new businesses, as well as serve the current and new residents.

Applicant: Kent County

Project: Chestertown Business Campus

Amount: \$250,000

The infrastructure allows access to building sites for multiple speculative commercial and mixed-use buildings. The Dixon buildings have retained over 350 jobs in Kent County, and the spec spaces have the potential to create an estimated 400 new jobs.

This project is the best approach for a small rural area like Kent County the majority is privately funded and the combination of Dixon as the anchor business, and KRM Development experience of developing and managing business parks. The funds would be used to develop the next phase, which includes the main entrance from Maryland Route 213, and the Dixon Square roads. This public infrastructure is necessary to move forward with this phase of the project. Dixon Square and the Route 213 entrance roads will be dedicated to the Town once completed.

Queen Anne's County – 11 projects

Applicant: Queen Anne's County

Project: QAC 4 H Park Infrastructure

Amount: \$1,200,000

The QA County 4-H Park and the proposed infrastructure improvements for the grounds support the mission, vision, and values stated in the QA County Economic Development 10-Year Strategic Plan. Proposed infrastructure improvements to the aging 4-H Park will sustain growth opportunities for agriculture, support the 1,000 plus farms and their economic value, serve as a meeting place for agriculture educational events and activities. Growing interest in agriculture sciences and agriculture related businesses is named as one of the highest opportunities for supporting the County's economic development.

Applicant: Queen Anne's County ED

Project: QA Strategic Asset & Industry Competitive Analysis Study

Amount: \$80,000

Queen Anne's County, Maryland is looking to engage a firm to assess sites for industrial development, site visit presentation review, and industry competitive analysis.

Applicant: Town of Centreville

Project: Centreville Wastewater Treatment Plant Upgrades

Amount: \$500,000

QA Comp plan states pushing growth towards municipalities; has 1 business park ready; can annex additional property for 1-2 business parks

Portions of the upgrade to the wastewater treatment plant will not be eligible for funding through MDE and Federal earmark funding is limited therefore the town is seeking a portion of the funding to modernize the wastewater system.

Applicant: Town of Church Hill
Project: Cell Phone Tower Construction
Amount: \$10,000

Town wants to erect at 195 foot cell tower on wastewater treatment plant property to enhance wireless communications including internet and broadband for Church Hill and surrounding areas. To improve and enhance wireless communications, including internet and broadband for the Town of Church Hill and surrounding areas. Will benefit commercial development.

Applicant: Queen Anne's County ED
Project: Minority Entrepreneurship Training Accelerator
Amount: \$75,000

META will be a 1-year, intensive business development and coaching program for Black and other minority sole proprietorships (SP) that will lead to the creation of fully formed LLCs equipped with tangible assets and a targeted microgrant to help fund future expansion on Maryland's Upper Eastern Shore.

Applicant: Chesapeake College
Project: The Future Works Workforce Training
Amount: \$141,599

Marine Trades Expand the College's marine trades program by purchasing additional equipment, adding new curriculum, and offering courses in collaboration with QACPS at a cost of \$100,000 Build an Advanced Manufacturing Technology (AMT) program to provide trained workers for Queen Anne's County businesses that already utilize AMT, like GROCO and PRS Guitars, and make AMT a reality for others.

Applicant: Queen Anne's Public School System
Project: QAPS Career Awareness & Development Initiative
Amount: \$600,000

The vision for the Office of Career and Technical Education of Queen Anne's County Public Schools to have a dedicated Career Center housed in both high schools. This office would be staffed by a Career Counselor whose position is solely dedicated to career awareness, guidance and career connections for our students. The Career Counselor would work with students, businesses and the Queen Anne's County CTE Liaison to establish meaningful and purposeful internships and apprenticeships that meet the needs of local workforce demand.

Applicant: Town of Sudlersville
Project: Project Consultant
Amount: \$100,000

To complement the work the county and town are doing to make economic prosperity for Sudlersville a reality, the town is proposing to contract with a consultant that will focus on economic development initiatives – creating a formal economic development strategy, ensuring their sustainable communities renewal plan gets implemented, ensuring the comp plan process is on track, acting as another resource to keep track of projects and connections that will help the town thrive, seeking appropriate funding opportunities and reporting on existing grants, working toward a placemaking initiative, etc. The town is also seeking funding for a consultant to complete a new comprehensive plan.

Applicant: Queen Anne's County Government
Project: CBBP Broadband Access
Amount: \$71,201

Funding is being sought to cover the cost of construction to install underground fiber capable of providing uninterrupted service in any weather condition along a 1.89 mile path so service can be provided to any and all sites in the Chesapeake Bay Business Park.

Applicant: QAC Watermen Association
Project: Oyster Shell Recovery & Spat Planting Program
Amount: \$10,200

To purchase equipment and larvae for oyster restoration projects in Queen Anne's County. We are investing in new techniques that are more cost effective and less reliant on oyster shells which are becoming more difficult to acquire.

Applicant: Queen Anne's County Economic Development
Project: Growing Agribusiness in QAC Feasibility Study
Amount: \$75,000

An evaluation of current infrastructure, geographic and environmental considerations, and local, state & federal code and policy (planning, health department, taxes). Potential economic impact to the county. Short term actions (such as marketing) to highlight agribusiness. Long term potential solutions for challenges and barriers to the growth of agribusiness that exist. Partnering opportunities to promote agribusiness (for example, Parks, Main Street programs, Regional events, etc.)

Regional - 8 projects

Applicant: Upper Shore Regional Council
Project: USRC Business Mentoring Program
Amount: \$50,000

The Upper Shore SCORE Chapter recently dissolved, due to demands of headquarters that volunteers must work 20 hours per week, can only meet with business start-ups via zoom, and must serve the entire state of Maryland. Our mentors have significant experience and are dedicated to assisting their local community and know firsthand their start-ups want in person assistance and coaching. Nine previous SCORE mentors have expressed an interest in

continuing to serve small business start-ups and entrepreneurs in the region. The program would be centralized on the Upper Shore Regional Council's website and have a page for each county to be tailored to the way business start-ups and entrepreneurs access assistance. Our economic development managers would work with the group to have quarterly meetings to ensure we are serving the targeted audience.

Applicant: Upper Shore Regional Council
Project: USRC CEDS
Amount: \$145,000

Create a strategy driven plan for regional economic development. The CEDS provides a vehicle for individuals, organizations, local governments, institutes of learning, and private industry to engage in a meaningful conversation and debate about what capacity building efforts would best serve economic development in the region. Work with EDA.

Applicant: Upper Shore WIB
Project: Incumbent Worker Training - Upper Shore WIB
Amount: \$134,000

We would fund 7-10 businesses in each county and work with the county's economic development departments for targeting employers looking to expand and retain and retrain their current workforce. Our outcomes would be measured by the type of business who is the recipient, its effect on the local economy, and the results of the incumbent worker training on their employees and the projected business growth.

The USWIB would measure training from the perspective: did it allow an incumbent get training to get promoted, did the training allow the company to expand their business, and did the training free up lower skill jobs that may be easier for the company to fill in this challenging job market. Additionally, did the IWT help the business expand into new areas or retain critical contracts.

Applicant: SWN
Project: Business Workforce Innovation Program
Amount: \$67,000

SWN proposes to utilize the Rural Economic Development Fund grant monies to prioritize support to business where existing programs and mechanisms are not the best avenue and/or mechanism to meet the need of the company and workers. Training strategies will include incumbent worker initiatives, work-based learning opportunities and On the Job training and other workforce development initiatives to assist the business and its employees.

Applicant: Chesapeake College
Project: The Future Works Workforce Training
Amount: \$200,000

Marine Trades - Expand the College's marine trades program by purchasing additional equipment, adding new curriculum, and offering courses in collaboration with QACPS & KCPS

Center for Innovation & Entrepreneurship (salary) Create a Center for Innovation and Entrepreneurship that will serve QA County & Kent County business owners, students—particularly in the skilled trades—and alumni both in-person and virtually with vetted small business management resources, professional growth, and workforce and leadership development. New Program Director in Advanced Manufacturing Tech (salary) Build an Advanced Manufacturing Technology (AMT) program to provide trained workers for QA County & Kent County businesses that already utilize AMT, like GROCO and PRS Guitars, and make AMT a reality for others.

Applicant: Cecil College
Project: Equipping a Marine Service Technology Classroom
Amount: \$100,000

Cecil College proposes to launch a marine service technology-training program to boost the workforce and support the needs of the industry in the region.

Applicant: Upper Shore Rural Council
Project: Marketing for Business Attraction
Amount: \$245,000

Marketing plan tied to counties' strategic plans and the regional strategic plan; Marketing plan tied to USRC Industry cluster study, QA asset study, and promotes the DataStory for each county; Marketing plan will have a regional component and individual county component. Marketing will be in print, digital, trade shows, billboard, television, etc

Applicant: Queen Anne's County ED - USRC
Project: USRC Career Technical Education Program
Amount: \$320,000

This proposed program addresses the middle-skills workforce shortage in the region by creating a comprehensive approach and building upon Project Bright Future. Hire a CTE liaison for each county (QA already has this position), building a skills network through collaboration with community colleges, businesses, and public schools, and build well-designed internships and apprenticeships. Increase awareness of middle skill opportunities by promoting the message that CTE gives students an economic advantage by being linked with high-paying, high-growth jobs. As the next step in Project Bright Future and with the continual support of the Upper Shore Regional Council, Queen Anne's County hired a CTE Liaison in June 2021. This position is located within their Department of Economic Development. Because of USRC support, QA County agreed to have the CTE Liaison cover both QA County and Kent County. This position has been wildly successful!

Tri County Council of Western Maryland

Allagany County	5 projects	\$ 3,460,255
Garrett County	4 projects	\$ 3,272,855
Washington County	12 projects	\$ 3,216,880
Administrative expense		\$ 50,000

Total \$ 9,999,990

Allegany County - 5 projects

Applicant: Cumberland Economic Development Corporation
Project: 19 Frederick Street Renovation
Amount: \$1,000,000

The building formerly known as 19 Frederick Street is located in the Central Business District Zoning District (CBD) of Cumberland, Maryland and has been underutilized since the Allegany County Human Resource Development Commission (HRDC) relocated to their newly constructed office building in 2010. The building consists of 17,000+/- square feet above grade (excluding basement) and stands near the center of downtown Cumberland on approximately one-third of an acre of land. The building is owned by the Mayor and City Council of Cumberland and is listed on the National Register of Historic Buildings. The building was originally designed and constructed as a U.S. Courthouse and Post Office in 1902 and has had several uses. The Mayor and City Council of Cumberland is requesting \$1,000,000 of funding to help renovate the building back to an occupiable state, and then market the building for resale/lease to the private sector.

Applicant: Allegany College of Maryland
Project: Nursing Expansion and Enhancement to Meet the Needs of Western MD
Amount: \$480,255

Funding would allow ACM to fully implement a weekend hybrid program to prepare RN-qualified nurses to enter the workforce to serve hospitals that are in dire need of qualified nurses. In addition, funding would support the enhancement of clinical simulation equipment at ACM and at the Garrett nursing education site.

Applicant: Allegany County Dept. of Economic and Community Development
Project: Allegany County Tech Incubator
Amount: \$100,000

Requesting funds to fully build out a scalable tech incubator, \$60,000 will cover the first two years of the lease of a building in downtown Frostburg. After this time, the incubator will be generating enough revenue to continue to pay for the maintenance and upkeep of its facilities. \$20,000 will cover the costs of building our additional IT infrastructure, which includes independent wireless access point coverage and multi-tenant server racks. \$20,000 will be earmarked for branding and marketing.

Applicant: Allegany County Commissioners, Economic & Community Development
Project: Shovel Ready Pad Sites-Barton Business Park
Amount: \$1,209,000

Summary: The Barton Business Park is located off of Route 220 South, in Cumberland, Maryland. The Park currently consists of 4 vacant lots, as well as a 40,000 SQ Ft. Shell Building. This building is being actively marketed and currently has numerous businesses interested in leasing or purchasing. Since the Shell Building was completed in 2018, the business landscape has changed. It has been determined that potential manufacturing businesses or developers would

rather have a shovel ready, or market ready site as opposed to an existing building. These prospective companies or developers would rather have something site so that they can build to suit, rather than have an existing building. Thus, the Allegany County Commissioners are seeking funding to make 3 of its remaining lots in the Barton Business Park shovel ready.

Applicant: Allegany County ED
Project: Shovel ready pad site - Frostburg Industrial Park
Amount: \$671,000

Existing industrial park, request to make four remaining lots shovel ready. The Frostburg Industrial Park has seen some major growth this past calendar year. We have seen a new 13,000 SQ Ft building be constructed that is the new home of Berkley Springs Instruments, as well as a 60,000 SQ Ft. addition built by Sierra Hygiene. This had led to both companies adding additional employment and has allowed them to expand their product and inventory offerings. To continue with this momentum, Allegany County is looking to make the remaining 4 lots at the Park shovel, or market ready.

Garrett County - 4 Projects

Applicant: Garrett County Government
Project: Garrett Growers COOP
Amount: \$70,000

Garrett Growers Cooperative is a group of vegetable farmers in Garrett County which sell local produce to restaurants, retail outlets and wholesale. As Garrett Growers increases production a major issue is keeping the produce cooled from harvest to delivery. Because of the weather, geography and topography of Garrett County, all the farms involved are considered “small,” according to the National Agricultural Statistics Service. In particular, fresh produce farms tend to be less than 10 acres and are run by part-time farmers. These farms do not have the capacity to expand without the availability of cold storage and packing infrastructure. A shared use facility that provides food-safe areas for washing, drying, culling, packing, storing, and shipping with appropriate temperatures and humidity levels for many types of products would help local farm businesses expand and thrive. The facility could serve as a place for food processing innovations and experimentation that allows for economic food product development. To increase the efficiency of local food aggregation and distribution in the region, this project will renovate an existing facility to create a facility capable of offering space for larger-scale aggregation, washing, packing, cold storage, and distribution of fresh produce and other local food products. This facility will enhance the capacity of Garrett Growers to comply with food safety regulations, help local agribusinesses, including Amish and Mennonite farmers, access larger markets with modern food processing capabilities, and help regional food businesses access fresh local foods.

Applicant: Garrett County
Project: Garrett County Shell Building
Amount: \$2,906,855

This project for the Garrett County Shell Building will achieve job creation, leveraged private investment (for equipment and retrofits), reduce business costs, improve business and the community, with a new design and construction of a 100,000 square foot building allowing for business expansion and start-up. Garrett County Government has been contacted by businesses needing 100,000 square feet of building space proposed to be located at the Keyser's Ridge Business Park.

Applicant: Garrett County
Project: Garrett County Public Utilities
Amount: \$60,000

This project is for the development of "Garrett County Public Utilities-GIS Modeling," a county-wide digital water and sewer utility model to reduce costs, provide better service to households and businesses, and increase the efficiency of DPU repair and information requests. The digital model will be used to collaborate with the municipalities and service areas for updating the Water and Sewer Plan.

Applicant: Garrett College
Project: CDL Training
Amount: \$236,000

Continuing Education & Workforce Development, a division of Garrett College, operates a successful Class A and Class B Commercial Driver's License (CDL) program through its Mountaintop Truck Driving Institute (MTDI). During Fiscal Year 2022, students completing Class B training boasted a 100% pass rate in achieving their CDL, while Class A students achieved a 97% pass rate. The intent of this project is to build upon the solid foundation at MTDI by incorporating technology into the program. Simulation technology is becoming increasingly important in successful truck driving programs, providing students with a variety of experiences which can be mastered before ever getting behind the wheel and driving over-the-road. The simulation technology will also allow for the expansion of training opportunities to younger students, through dual enrollment with Garrett County Public Schools.

Washington County - 12 projects

Applicant: Washington County Government
Project: Strategic Planning and Economic Feasibility Study
Amount: \$250,000

The Department of Business Development is requesting the use of \$250,000 from the Rural Maryland Economic Development Fund for the entire Strategic Planning and Feasibility Study Program/Project. Although we do not see any ongoing administrative costs for the initial study and subsequent report, we would potentially seek to use any remaining funds to invest in a marketing plan, changes of branding or identity, that could potentially be a result from such study.

Applicant: Town of Boonsboro
Project: Boonsboro Reservoir
Amount: \$100,000

Project entails replacing an aging, 68 year old structurally unsound drinking water impoundments, with a new reinforced, precast, and prestressed concrete split-tank reservoir, of equal capacity. Ultrasonic meter testing indicates the reservoir leaks approximately 6-9 million gallons of treated water, annually. Electrical resistivity testing, and a scuba dive survey, confirms a significant leak. Due to the age of the leak, structural damage is expected, and a complete replacement is necessary and an emergency priority. The reservoir is the Town's only pressure source. Structural failure would result in flooding, property damage, and loss of water and sewer service to 4,800 Maryland Residents.

Applicant: Town of Boonsboro
Project: Volute Press
Amount: \$250,000

Funding for this project will be used to install sludge dewatering facilities at the town's wastewater treatment plant. The project will allow the sludge generated by the plant to be dewatered and stored on-site, until it can be land applied as fertilizer. Currently, the liquid sludge is hauled to a different plant for dewatering/treatment - a costly process which accounts for nearly a quarter of the plant's annual budget. The town predicts a 68% reduction in annual operating costs for the plant as a result of moving biosolid removal on-site, which will lower rates for both businesses and households.

Applicant: Town of Smithsburg
Project: Smithsburg Infrastructure Reports
Amount: \$100,000

The Town of Smithsburg is requesting funding to help secure infrastructure reports needed to determine how future projects critical to the Town's growth be prioritized. Currently the Town lacks needed reports designed to help with determining faults in their aging water & sewer systems such as PERs and I&I studies, as well updating the CIP to direct leadership on how to prioritize needed repairs to the streets and overall infrastructure.

Applicant: Washington County Convention and Visitors Bureau
Project: Washington County MD Visitors Welcome Center
Amount: \$400,000

Seeking funds for the design of a new Visitors Welcome Center to include research, public engagement, engineering, permitting and construction documents.

Applicant: Washington County Community Action Council
Project: Workforce Transportation
Amount: \$355,000

Over the past several years, Washington County and Hagerstown in particular has seen a growth in warehouses being built with more in the planning stages. Due to the proximity to Interstates 70 & 81, Hagerstown is an ideal location for businesses to ship or build their products. This is great for economic growth in our jurisdiction. The jobs created for the development of the industrial parks as well as the jobs created (HVAC, plumbing, electrical) to provide services for these businesses. However, in order for these businesses to be successful and sustainable, they need a reliable workforce. These businesses create an opportunity for employment which is essential for the low income population CAC serves. This is a workforce that will spend their paychecks locally on rent, groceries, other essentials and entertainment. This is a tremendous benefit to the local economy. Therefore, providing transportation for the workforce supporting the millions of warehouse space will have a significant impact on the economic growth of Washington County.

Applicant: Woman of Valor Ministries
Project: Xcel Launch
Amount: \$55,890

The Xcel Launch Program is committed to helping people start, run, and grow their small businesses. ValorExcel and the EM Tobias Family Center have teamed up to launch a new shared business center located at 324 E. Antietam Street, Suite 204B in Hagerstown, Maryland, which offers shared space for an all-inclusive fee. It also provides business coaching, specialized training, and development services to ensure successful outcomes.

Applicant: The Town of Boonsboro
Project: National Road Museum
Amount: \$206,000

The Town of Boonsboro seeks the funding to improve infrastructure at the National Road Museum and increase marketing efforts of the Boonsboro EDC located on the Historic National Road Scenic Byway and adjacent to the Appalachian Trail, is positioned well to become a desired Main Street destination for visitors and home to new residents and businesses.

Applicant: Hagerstown Goodwill Industries DBA Horizon Goodwill
Project: Homeless Workforce Pathway
Amount: \$250,000

Horizon Goodwill Industries (HGI) has operated in the 3 Western Counties in Maryland offering workforce development services since 1955. In 2019, HGI broadened our service delivery beyond traditional workforce development programs to include services targeting disconnected youth, homeless youth, and homeless adults. The catalyst for this change was the recognition of the organization that many of the individuals that we were serving in workforce programs were lacking the ability to meet their basic needs which presented a barrier to engaging in job training and employment. In addition to providing these services in Maryland, Horizon Goodwill Industries is a

member of WV Balance of State and Virginia Continuum of Care providing homeless and workforce services in these states. In FY22 HGI served 196 homeless individuals in our housing and workforce programs, 144 of this individuals engaged in job training and placement services and became employed as a result. We continue to see an increase in homelessness in Washington County, by co-locating housing, case management, job training, and placement services we have seen increased success pathing homeless individuals to sustainable employment and stable housing.

Applicant: The City of Hagerstown
Project: Zone 5 Water Storage Tank
Amount: \$500,000

Phase 1 of a multi-phased project for land acquisition and development of planning, permitting, contract documents (design, bid, contract, etc.) for an elevated water storage tank to be constructed for fire protection to serve water pressure zone 5 and portions of water pressure zone 1. Tank design will also address water system pressure concerns for properties located at geographically higher elevations. Construction of the proposed potable water storage tank will allow for continued growth within Washington County. Properties to be served by this project are located in water pressure zone 5 and a portion of water pressure zone 1 located outside of the Hagerstown Municipal Boundary. Direct benefit to the City of Hagerstown at the completion of this project is limited to increases in revenues from the sale of water and wastewater as the area adds new customers to the water and wastewater systems. Indirect benefits to the City of Hagerstown include revenue from taxes associated with retail, hotel/motel, entertainment, etc. Washington County will benefit from all property tax revenue as well as revenue from retail sales, hotel/motel, entertainment, etc.

Applicant: Camp Ritchie Museum, Inc.
Project: Fort Ritchie Historic District Rehabilitation Project
Amount: \$500,000

Camp Ritchie Museum, Inc. at Historic Fort Ritchie is proposing a rehabilitation project that will bolster business development and tourism in Washington County. Fort Ritchie's iconic Barrick Avenue which contains 37 finger buildings used by both the Maryland National Guard and later the United States Army for the purpose of classrooms, administrative buildings and military intelligence training has the capacity to become its own Main Street Maryland community. Converting these vacant, nearly century old structures into a variety of shops, boutiques, restaurants, and overnight lodging, will encourage thousands to visit our region to enjoy our unique landscapes and history as well as support the growth of our regional economy. This rehabilitation project will additionally continue to revive the Cascade Community which saw a major reduction of workforce with the exit of the United States Army in 1998.

Applicant: Hagerstown Community College
Project: Allied Health Workforce Development
Amount: \$249,990

Hagerstown Community College will deliver technical assistance, training, and career placement assistance designed to align worker training with in-demand career fields in the

Transportation/Logistics and Allied Health sectors. Focus will be on under-represented populations in these key employment sectors, including women, justice-involved individuals, and English-language learners, seeking to upskill into high-demand and well-paid employment in two growing employment sectors: transportation/logistics and allied health. Primary focus will be on supporting economic development in Washington County by aligning job training with employers needs in the logistics, transportation and allied health sectors. A secondary focus will be on strengthening the regional transportation and logistics workforce in Western Maryland by developing a partnership with Allegany College of Maryland (ACM) to deliver a CDL-B and forklift operator “boot camp” training program in Allegany County, MD, that leads to licensing and employment



**Herbert Dennis, Warden, Kent County Detention Center and Penny
Young-Carrasquillo, Grants Manager
1/24/2023
County Commissioners Meeting**

Item Summary:

Opioid Use Disorder Treatment Initiative Contract Update

ATTACHMENTS:

Description

01.24.2023 Revised Agreement for Substance Use Disorder Telehealth Services, by and Between the University of Maryland Psychiatry Associates, P.A., and Kent County

**AMENDED AND RESTATED AGREEMENT FOR SUBSTANCE USE DISORDER
TELEHEALTH SERVICES
BY AND BETWEEN
UNIVERSITY OF MARYLAND PSYCHIATRY ASSOCIATES, P.A.
AND
KENT COUNTY**

THIS AMENDED AND RESTATED AGREEMENT FOR SUBSTANCE USE DISORDER TELEHEALTH SERVICES (this “**Agreement**”), effective as of the date listed in Article I of Exhibit A to this Agreement (“**Effective Date**”), is by and between the University of Maryland Psychiatry Associates, P.A. (“**UMPA**”) and Kent County, State of Maryland (“**COUNTY**”), and is for the purpose of establishing the terms of the parties’ agreement for UMPA to provide certain non-billable telehealth services (the **Services**, as defined below) to COUNTY.

RECITALS

A. COUNTY has identified a need to provide the Services via telemedicine to inmates with Opioid Use Disorder in COUNTY’s jails (“**Recipients**”). COUNTY does not have the resources to fulfill its need for such Services and would like to engage UMPA to provide such Services.

B. UMPA has agreed to provide the Services as described below to the Recipients, which will be rendered by UMPA physicians (“**Faculty Physician(s)**”).

C. The compensation to be paid by COUNTY to UMPA, as set forth in Section 3.1, is to compensate UMPA for the availability of the Faculty Physician(s). There will be no billing of Recipients or insurance carriers for any of the Services provided to COUNTY or Recipients under this Agreement.

D. UMPA agrees to provide the Services to COUNTY according to the terms and conditions of this Agreement.

E. The parties to this Agreement previously entered into that certain Agreement for Substance Use Disorder Telehealth Services, but have since discovered errors in Exhibit A to the agreement and have agreed to enter into this amended and restated agreement in order to correct those mutual oversights.

NOW, THEREFORE, the parties agree as follows:

Section 1 - SERVICES

1.1. General. The Recitals are incorporated into this Agreement. UMPA’s Faculty Physicians shall provide direct care telehealth treatment for substance use disorder to the Recipients (the “**Services**”) according to a schedule of dates and times for the Services as mutually

agreed in advance by the parties, but which shall not exceed four hours (4) per week, to include one scheduled two (2) hour block of time to evaluate and treat patients and up to an additional two (2) hours for charting, writing orders, phone consultation with detention center nurse, availability to see new admissions outside of the block time, writing bridge prescriptions for patients that are being discharged and similar services. In addition, UMPA will work in collaboration with COUNTY jail staff, and appropriate partners, to develop and implement standard operating procedures for the screening and treatment of individuals with Opioid Use Disorder incarcerated at the COUNTY's jails.

1.2. Supervision; Staff Direction. Dr. Eric Weintraub or his successor or designee (the “**Director**”) shall have overall responsibility for the provision of the Services and for supervising the Faculty Physicians.

1.3. Recommendations. During the course of providing the Services, the Faculty Physician(s) may provide information to COUNTY and/or health care providers regarding a specific Recipient's course of treatment. The parties acknowledge and agree that UMPA shall not have any liability resulting from the failure of a Recipient or COUNTY or its employees, agents, or representatives to follow any advice or recommendations of UMPA. Any employee, agent, or representative of COUNTY or UMPA who has a grievance or concern related to the provision of Services or any interference with, or failure to follow, said advice or recommendations should report the grievance or concern to the Director, who will promptly work with COUNTY to resolve the issue.

1.4. Compliance with Applicable Standards. COUNTY will submit to UMPA all policies, ethical codes or guidelines, rules, regulations, and generally applicable orders promulgated by COUNTY as may be applicable to activities under this Agreement (“**COUNTY Applicable Standards**”). Additionally, in the event of a conflict or inconsistency between these COUNTY Applicable Standards and UMPA's policies, ethical codes, guidelines, or rules, UMPA will consult with COUNTY, if circumstances reasonably permit, to determine an appropriate course of action.

1.5. Recipient Choice. Nothing in this Agreement shall prevent a Recipient or any other party from seeking treatment for any symptoms, illness, or condition from any health care provider, even if the health care provider is not affiliated with UMPA or the Faculty Physician(s).

1.6. COUNTY Obligations. COUNTY acknowledges that the provision of effective telemedicine or telehealth services requires the cooperation of the patient and those responsible for the care and/or custody of the patient. Therefore, UMPA's performance of Services hereunder is expressly condition on COUNTY being responsible for the effective screening of patients for opioid use disorder, providing a secure area in which the patient is to be examined, providing a coordinator for telemedicine sessions, and providing buprenorphine medication for patients.

Section 2 - ADMINISTRATIVE DUTIES OF THE PARTIES

2.1 General. In addition to any administrative responsibilities set forth in this Agreement, UMPA shall be responsible for the performance of general administrative duties in support of effective and efficient Services, including any necessary reports to COUNTY.

2.2 Medical Record Documentation. COUNTY will be responsible for maintaining and retaining accurate, complete and up-to-date medical records for all Recipients related to the Services. All costs related to maintaining such records will be COUNTY's responsibility and all such records will be the property of COUNTY. COUNTY will cooperate with UMPA to enable UMPA's providers to access appropriate patient history in connection with performance of the Services.

Section 3 - COMPENSATION FOR SERVICES

3.1 Compensation for Services. COUNTY shall compensate UMPA in the amount provided in Article III of Exhibit A to this Agreement.

3.2. No Billable Services. UMPA acknowledges and agrees that its physicians are not entitled to direct payment of any kind from COUNTY for services rendered under this Agreement. COUNTY shall not make or deliver any payments directly to any physician, but any direct payment to any physician shall not constitute payments to UMPA under this Agreement. UMPA further agrees that it will not bill third party payors for the Services. COUNTY may bill third party payors and UMPA will cooperate with that process by having their providers submit any forms necessary for patient and third party payments for services as reasonably requested. No party will bill any patient or third party payor for the costs associated with telemedicine technologies, equipment or software that may be utilized under this Agreement.

3.3 Invoicing and Payment. COUNTY shall pay the amounts due under this Agreement to UMPA within thirty (30) days after receipt of an invoice from UMPA; invoices will be sent quarterly during the term of the Agreement and all payments shall be made payable to "University of Maryland Psychiatry Associates, P.A."

Invoices shall be sent to:

Grants Manager
Kent County
400 High Street
Chestertown, MD 21620

Section 4 - CONTROL

Except as otherwise expressly provided elsewhere in this Agreement, COUNTY shall neither have nor exercise any control or direction over the methods by which UMPA, the Faculty Physicians, or any other UMPA staff perform the Services. In providing the Services, UMPA shall act as an independent contractor; no employee of UMPA or other actor under this Agreement shall be deemed an employee or agent of COUNTY as a result of providing Services under this

Agreement. Except as otherwise expressly provided elsewhere in this Agreement, UMPA shall have the exclusive authority to assign the Faculty Physician and other staff to perform specific duties and responsibilities. COUNTY shall have no control over, or right to interfere with, the means employed by UMPA to fulfill its obligations under this Agreement.

Section 5 - INSURANCE

5.1. Professional Liability Insurance. The Faculty Physician(s) providing medical Services under this Agreement shall have professional liability coverage at the commencement of this Agreement and thereafter, on a shared limits basis, in amounts not less than \$1,000,000 for each medical incident and \$3,000,000 in the annual aggregate, through the Maryland Medicine Comprehensive Insurance Plan (“MMCIP”).

5.2. Tort Claims Act. UMPA’s liability shall be determined exclusively in accordance with the Tort Claims Act under Maryland Annotated Code, State Government Article, Section 12-101, *et seq.* Third party claims not covered by MMCIP as medical malpractice claims may be subject to the Tort Claims Act.

Section 6 - FACILITIES, EQUIPMENT AND SUPPLIES PROVIDED BY COUNTY

6.1. Space. COUNTY shall designate space at COUNTY-controlled locations for UMPA’s duties under this Agreement. Such space shall include consultation space that is private and reasonably sound-proof and appropriate for the Services. Such consultation space shall be provided at no additional cost, and the Faculty Physician(s) shall have virtual access to such consultation space 24 hours per day, 7 days per week, on each day of the term of this Agreement.

6.2. Equipment and Supplies. COUNTY shall provide standard items that are reasonably expected to be present in a health services space, such as standard office equipment and supplies for UMPA and a comfortable seating area for Recipients. If UMPA requires additional supplies, UMPA shall provide those supplies at its cost. COUNTY will also provide all technology necessary for telemental health video conferencing.

Section 7 - COUNTY PERSONNEL

COUNTY shall bear all of the cost and expense associated with the employment of COUNTY personnel and provision of space, equipment and supplies contemplated by Section 6 above. Other than Recipients, no individuals at COUNTY will receive the Services set forth in this Agreement.

Section 8 - UMPA PERSONNEL

8.1. Licenses; Privileges. The Faculty Physician(s) providing Services under this Agreement shall have a Doctor of Medicine (MD) degree or a Doctor of Osteopathic Medicine (DO) degree. All medical personnel assigned by UMPA to perform Services under this Agreement shall be: (a) licensed by the appropriate board to practice in the State of Maryland; and (b) responsible to provide prompt assessment, evaluation, treatment, and the Services within the

standards of practice as set forth in the Annotated Code of Maryland, as amended, and the Code of Maryland Regulations (COMAR).

8.2. Additional Personnel. UMPA may at its own expense provide technical, administrative, secretarial, and clerical personnel, if needed (as determined by UMPA) in order to perform the Services.

Section 9 - TERM; RENEWAL; TERMINATION; DEFAULT

9.1. Term, Renewal, Termination.

9.1.1. The term of this Agreement began on the Effective Date, and shall expire on the date which falls one day prior to the second (2nd) anniversary of the Effective Date (the “**Term**”). By written agreement of the parties, this Agreement may be renewed for additional terms. If COUNTY and UMPA so agree, then beginning 90 days prior to the expiration of any term, the parties will review the costs and services being provided and negotiate terms for renewal. If concerns over performance arise at any time during the term of the Agreement that require immediate attention and are unable to be informally resolved, a formal meeting will be held between **Penelope Young-Carrasquillo, Grants Manager** of COUNTY or his or her designee and the Chair of UMPA or his or her designee to implement a plan to improve performance or to mutually agree to immediately terminate the relationship.

9.1.2. This Agreement may be terminated without cause for any reason upon one party providing the other with a minimum of 60 days prior written notice.

9.2 Default. As used herein, Default means a material breach of the terms of this Agreement.

9.3 Right to Cure. Upon the occurrence of any Default, the non-defaulting party shall provide written notice of the Default to the defaulting party, and the defaulting party, after receiving such notice, shall have 30 days to cure the Default.

9.4 Non-Defaulting Party’s Remedies. If the defaulting party has not cured the Default within the 30 day cure period, the non-defaulting party may immediately terminate this Agreement. There shall be no right to cure upon the occurrence of any Default which is not reasonably susceptible to cure, which breaches or threatens to breach privacy laws, or which impacts the health or safety of the Recipients or either party’s employees.

Section 10 - PRIVACY STANDARDS

10.1. Privacy of Health Information. The parties shall comply with all applicable federal and State confidentiality requirements regarding the collection, maintenance, use, and disclosure of health information. This includes, where appropriate, (1) the Health Insurance Portability and Accountability (HIPAA) Act of 1996 (42 U.S.C. § 1320d et seq. and implementing regulations at 45 CFR parts 160 and 164) as amended, (2) the Confidentiality of Alcohol and Drug Abuse Patient

Records (42 U.S.C. 290dd-2, as implemented at 42 C.F.R. Part 2) as amended; and (3) the Maryland Confidentiality of Medical Records Act (MCMRA) (Md. Code Ann. Health-General § 4-301 et seq.) as amended. All health and demographic information (“**Protected Health Information**” or “**PHI**”) will be maintained by and in the sole custody of COUNTY.

10.2. Access to Records by UMPA. Subject to the laws of confidentiality governing medical records, UMPA and its agents, including but not limited to the MMCIP, shall have access to patient records, files, charts and other written or recorded material, including billing records, provided that such material relates to patients treated by UMPA’s physicians and (i) is necessary for UMPA’s performance of the Services, (ii) is necessary for UMPA to answer or defend any inquiry, suit, investigation or claim made by a patient serviced by UMPA, (iii) is necessary for the continuing care of a patient, (iv) is for quality of care purposes, or (v) is otherwise permitted by law.

10.3 Access to Records in Custody of UMPA. To the extent required by Section 1861(v)(1)(I) of the Social Security Act and the regulations promulgated thereunder, until the expiration of four (4) years after the furnishing of any product or service pursuant to this Agreement, UMPA shall make available, upon written request by the Secretary of Health (the “Secretary”), or upon request by the Comptroller General (the “Comptroller”), or any of their duly authorized representatives, copies of this Agreement and any books, documents, records or other data of UMPA that are necessary to certify the nature and extent of any costs incurred by UMPA for such products and services. If UMPA carries out any of its duties under this Agreement through a subcontract with a related organization involving a value or cost of ten thousand dollars (\$10,000) or more over a twelve (12) month period, UMPA will cause such subcontract to contain a clause to the effect that, until the expiration of four (4) years after the furnishing of any product or service pursuant to said contract, the related organization will make available upon the written request of the Secretary or the Comptroller, or any of their duly authorized representatives, copies of records of said related organization that are necessary to certify the nature and extent of cost incurred by UMPA for such product or service.

Section 11 - MISCELLANEOUS

11.1. Notice. All notices given pursuant to this Agreement shall be in writing and shall be either: (i) personally delivered; (ii) sent by certified mail, postage prepaid, return receipt requested; or (iii) sent via overnight mail by a nationally recognized carrier; and shall be addressed:

If to COUNTY: See Article IV of Exhibit A to the Agreement.

If to UMPA: University of Maryland Psychiatry Associates, P.A.
110 S. Paca Street, 4th Floor
Baltimore, Maryland 21201
ATTENTION: Administrator

With a copy to: University of Maryland Faculty Physicians, Inc.
250 West Pratt Street, 9th Floor
Baltimore, Maryland 21201
ATTENTION: General Counsel

Unless otherwise specified, any and all notices under this Section shall be deemed duly given on the date personally delivered as proven by a signed receipt. Either of the above-named parties may change its address by specifying such change in a written notice to the other.

11.2. No Waiver. No delay by COUNTY or UMPA in exercising any right granted it under this Agreement, or failure or omission by COUNTY or UMPA to exercise any right granted it hereunder, shall operate as a waiver of such right or preclude COUNTY or UMPA from exercising such right at any time during the term of this Agreement.

11.3. Notice of Claim. Each party shall promptly notify the other party of any claim it receives against it and/or the other party, which arises out of Services under terms of this Agreement. Each party shall make reasonable efforts to notify the other party of such claims within five (5) business days of receipt. A written letter of representation by a Recipient's attorney is considered to be a claim. Neither party shall be deemed to have waived any right to make a counterclaim, cross claim or third party claim against the other party by virtue of this Agreement, whether or not the other party fails to provide or receive notice within the time stated in this Section.

11.4. Successors and Assigns.

11.4.1. This Agreement shall be binding on the successors and permitted assigns of the parties.

11.4.2. Neither party may assign any of its rights, title or interest in this Agreement without the prior written consent of the other party, except that UMPA may assign the Agreement to any entity which controls, is controlled by or is under common control with it, or to a success in interest to its business.

11.5. Modification. This Agreement may be modified only in writing by a document signed by both parties.

11.6. Severability. If any provision of this Agreement or the application thereof to any person or circumstance is held invalid or unenforceable for any reason, the invalidity or unenforceability shall not affect the other provisions or any other reapplication of this Agreement which can be given effect without the invalid or unenforceable provisions or application, and to this end the provisions of this Agreement shall be severable.

11.7. Maryland Law. This Agreement shall be governed by and construed exclusively in accordance with the laws of the State of Maryland, without reference to its conflicts of laws rules.

11.8. Compliance with Law. At all times during the term of this Agreement, each party shall comply with all applicable federal, state and local laws in performing its obligations hereunder, including but not limited to the Deficit Reduction Act of 2005, the Federal False Claims Act and other federal and state laws addressing anti-kickback, self-referral, fraud, waste, and whistleblower protections for those reporting violations of such laws.

11.9. Non-discrimination. COUNTY and UMPA agree not to discriminate against any Recipient because of age, color, national or ethnic origin, race, political affiliation, religion, physical or mental disability, gender, sexual orientation, creed, marital status, genetic information, gender identity or expression, or status as a disabled veteran.

11.10. Employment Conflict. No employee of the State of Maryland, or any department, commission, agency or branch thereof, whose duties as such employee include matters relating to or affecting the subject matter of this Agreement shall, while such employee, become or be an employee of the party hereby contracting with said State of Maryland, or any department, commission, agency or branch thereof.

11.11. Basis of Award. UMPA warrants that it has not employed or retained any person, partnership, corporation or other entity to solicit this Agreement, and that it has not paid or agreed to pay any person, partnership, corporation or other entity any fee or other consideration contingent on the making of this Agreement.

11.12. No Third-Party Beneficiaries. This Agreement is not intended to create, and does not create, enforceable legal rights as a third-party beneficiary or through any other legal theory on the part of any Person.

[Signatures on following page]

AS WITNESS the due execution hereof:

KENT COUNTY

By:  [SEAL] 1/24/2023
Ronald H. Fithian, President 1/24/2023
County Commissioners of Kent County

UNIVERSITY OF MARYLAND PSYCHIATRY ASSOCIATES, P.A.

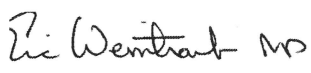
By:  [SEAL] 1/24/2023
Eric Weintraub, M.D. Date
Acting Chair

EXHIBIT A – KENT COUNTY

Article I (Effective Date)

The “Effective Date” of this Agreement is July 1, 2022.

Article II (County)

The party entering into this Agreement with UMPA is Kent County.

Article III (Compensation)

COUNTY shall pay UMPA compensation for the Services in the amount of Sixty-Nine Thousand Ninety-Eight Dollars (\$69,098.00) to cover salary and fringe benefits for Faculty and Trainee(s), coordination with other medical professionals, travel expenses, travel time, and administrative costs as follows:

	FY 2023	FY 2024
Allocated to Physician Salary (10% FTE)	\$22,000.00	\$22,660.00
Allocated to Physician Fringe Benefits (10% FTE)	\$5,500.00	\$5,665.00
Allocated to Clinical Assistant Salary (10% FTE)	\$5,876.40	\$6,052.60
Allocated to Travel for Meetings / Setup	\$672.00	\$672.00
Total	\$34,048.40	\$35,049.60
Total for Fiscal Years 2023 and 2024	\$69,098.00	

The physicians will be providing the services. The Clinical Assistant will complete data collection

Article IV (Notice Address for County)

For purposes of Section 11.1 of the Agreement, the County’s contact for Legal Notices is:

Grants Manager
Kent County
400 High Street
Chestertown, MD, 21620



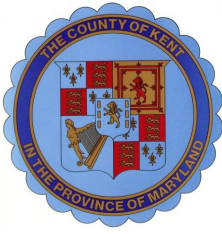
Fleet Management 1/24/2023 County Commissioners Meeting

Item Summary:

Enterprise Lease Agreements

ATTACHMENTS:

Description



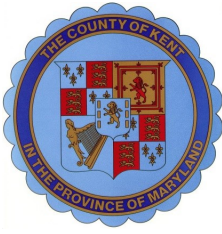
Parks & Recreation
1/24/2023
County Commissioners Meeting

Item Summary:

Full-Time Facility Monitor Vacancy

ATTACHMENTS:

Description



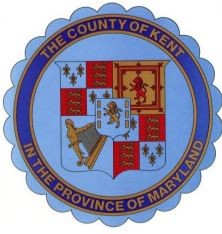
**Emergency Services
1/24/2023
County Commissioners Meeting**

Item Summary:

EMT-B Vacancies

ATTACHMENTS:

Description



Emergency Services
1/24/2023
County Commissioners Meeting

Item Summary:

Emergency Preparedness Planner Vacancy

ATTACHMENTS:

Description



Public Works
1/24/2023
County Commissioners Meeting

Item Summary:

Building Maintenance Worker I Vacancy

ATTACHMENTS:

Description



**Public Works
1/24/2023
County Commissioners Meeting**

Item Summary:

Public Works Deputy Director Vacancy

ATTACHMENTS:

Description



Public Works - Roads Division
1/24/2023
County Commissioners Meeting

Item Summary:

Crew Leader Vacancy

ATTACHMENTS:

Description



Public Works - Roads Division
1/24/2023
County Commissioners Meeting

Item Summary:

MEO Vacancy

ATTACHMENTS:

Description



Public Works - Water and Wastewater 1/24/2023 County Commissioners Meeting

Item Summary:

Utility Technician Vacancy

ATTACHMENTS:

Description



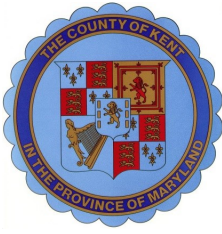
Shelly Neal-Edwards, Director, Department of Social Services
1/24/2023
County Commissioners Meeting

Item Summary:

Social Services Advisory Board Member Appointment

ATTACHMENTS:

Description



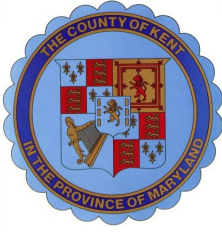
Mike Moulds, Director of Public Works
1/24/2023
County Commissioners Meeting

Item Summary:

Water and Wastewater Division, Worton Lagoon Sludge Removal Contract

ATTACHMENTS:

Description



Bonnie S. Pearsall, Inspector, Kent Alcohol and Tobacco Enforcement
1/24/2023
County Commissioners Meeting

Item Summary:

License Update

ATTACHMENTS:

Description

01.24.23 Goose Pointe, LLC 98 Cannon Riverfront Grille License Surrendered



Kent Alcohol and Tobacco Enforcement

To: Commissioners Fithian, Price, and Nickerson
From: Bonnie S. Pearsall, Inspector, and Sondra M. Blackiston, Clerk/KATE Manager
Date: January 24, 2023
Subject: Goose Pointe, LLC t/a 98 Cannon Riverfront Grille, License No. 4759 Surrendered

Memorandum

License Update:

A closeout inspection of Goose Pointe, LLC t/a 98 Cannon Riverfront Grille was completed on January 10, 2023. No alcohol is on the premise; a bulk transfer permit is not applicable. License No. 4759 a Class B, Beer, Wine, and Liquor License with Caterer's Privilege (CP) and Extended Privilege (EXPR) was surrendered. The license holder voluntarily surrendered the license before its expiration date. A refund will be granted per Annotated Code of Maryland, Alcoholic Beverages 24-1408.

This transaction will be recorded in the monthly report of retail license activity required by the Comptroller of Maryland, Field Enforcement Division.



**BOARD OF LICENSE COMMISSIONERS OF KENT COUNTY,
MARYLAND**

Kent Alcohol and Tobacco Enforcement
400 High Street, Chestertown, MD 21620
Office: 410-810-2212 ■ Cell: 443-282-5785

Inspection Report Type: Routine

Follow-Up Type:

Date and Time: January 10, 2023 9:32 AM

Name of Establishment: 98 Cannon Riverfront Grille

Address: 98 Cannon Street

City, State, Zip: Chestertown, MD
21620

Phone Number: 443-282-0055

License No.: 4759

License Types: B, BWL, CP, EXPR

TIPs Certified Person on Premise at Time of Inspection: Yes

Absentee Log Filled:

Comment:

Licenses Publicly Displayed:

Alcohol License: No

Comment: License surrendered to
alcohol inspector

**Fire Marshal Load
Capacity:** N/A

Comment:

Kent County Health Department Food Service Facility License:
N/A

Comment:

**Maryland Sales & Use Tax
License:** Yes

Comment:

Maryland Traders License:
Yes

Comment:

Keg Registration: N/A

Comment:

Taps Properly Labeled: N/A

Comment:

Dispensing System Cleaned Every 7 Days: N/A

Comment:

Dispensing System Cleaning Records Properly Maintained: N/A

Comment:

Financial Records Maintained for 2 Years:



**BOARD OF LICENSE COMMISSIONERS OF KENT COUNTY,
MARYLAND**

Kent Alcohol and Tobacco Enforcement
400 High Street, Chestertown, MD 21620
Office: 410-810-2212 ■ Cell: 443-282-5785

Alcohol: Yes	Comment:
Food: N/A	Comment:
Alcohol Awareness Training Records: No	Comment: Fire damage
Interior Signage Posted Against Selling to Minors: No	Comment: Fire damage
Exterior Signage Posted Against Drinking in Parking Lot: No	Comment: Fire damage
Prohibited Hours Posted (2 am - 6 am): No	Comment: Fire damage
Consumption After Hours: No	Comment:
<u>Storage:</u>	
On License Premise: No	Comment: Received license/ surrendered
Controlled Storage: No	Comment: Fire damage
Off-Premise Storage Permit: N/A	Comment:
Does There Need to Be a Follow-Up?: No	
Notations/Warnings: There was fire damage to restaurant/ restaurant closed/ license surrendered no alcohol stored at location/ close out inspection	
Violations: None	
Email: joeelliott34@gmail.com	
Verify Email Address: joeelliott34@gmail.com	
Licensee/Employee Name (Print): Chris Golder	
Signature:	



BOARD OF LICENSE COMMISSIONERS OF KENT COUNTY, MARYLAND

Kent Alcohol and Tobacco Enforcement
400 High Street, Chestertown, MD 21620
Office: 410-810-2212 ■ Cell: 443-282-5785

Ch Solo

Inspector Name (Print): Bonnie Pearsall

Signature:

Bonnie Pearsall





BOARD OF LICENSE COMMISSIONERS OF KENT COUNTY, MARYLAND

Kent Alcohol and Tobacco Enforcement
400 High Street, Chestertown, MD 21620
Office: 410-810-2212 ■ Cell: 443-282-5785



RECEIVED *BSP*

JAN 10 2023

No 4759

STATE OF MARYLAND
 ALCOHOLIC BEVERAGE LICENSE
 BOARD OF LICENSE COMMISSIONERS OF KENT COUNTY

CLASS A

Beer, Wine, Liquor _____
 Beer and Wine _____
 Beer _____
 Wine _____
 Extended Privilege (EXPR) _____
BWLT-Tasting
 Beer, Wine, Liquor _____
 Beer and Wine _____
 Beer _____
 Wine _____

CLASS B

Beer, Wine, Liquor X _____
 Beer and Wine _____
 Beer _____
 Bed and Breakfast (BWL) _____
 Country Inn (BWL) _____
 Brewery (B) _____
 Wine Shop and Lounge (W) _____
 Caterer's Privilege (CP) X _____
 Corkage Privilege (CKP) _____
 Extended Privilege (EXPR) X _____

CLASS C

Beer, Wine, Liquor _____
 Corkage Privilege (CKP) _____
CLASS D
 Beer, Wine, Liquor _____
 Beer _____
 Brewery (B) _____
 Extended Privilege (EXPR) _____

THEATER VENUE

Beer, Wine, Liquor _____

This is to certify that:

Catherine Perry-Strong, Member
Joseph B. Elliott, Member
Kristin L. Elliott, Member

Corporate name: Goose Pointe, LLC

is licensed by the STATE OF MARYLAND, to keep for sale and sell alcoholic beverages for the class indicated:

T/A: 98 Cannon Riverfront Grille
 Located: 98 Cannon Street
Chestertown, MD 21620

This license is issued under Authority of the Alcoholic Beverages Article of the Annotated Code of Maryland.

This license continues in force, unless revoked or suspended, until the last day of the month, **April 2023**

Cost of license: \$2,100.00 Issued the 25th day of May, 2022 Registration No. 17567938

Patricia Merrill

Kent County Chief Finance Officer

Revised 11/21

A license holder shall frame the license under glass and display the license conspicuously in the licensed premises.



Bonnie S. Pearsall, Inspector, Kent Alcohol and Tobacco Enforcement
1/24/2023
County Commissioners Meeting

Item Summary:

License Update

ATTACHMENTS:

Description

01.24.23 Haven Point Inn and Gallery, LLC, License Surrendered



Kent Alcohol and Tobacco Enforcement

To: Commissioners Fithian, Price, and Nickerson
From: Bonnie S. Pearsall, Inspector, and Sondra M. Blackiston, Clerk/KATE Manager
Date: January 24, 2023
Subject: Haven Point Inn and Gallery, LLC; License No. 4784 Surrendered

Memorandum

License Update:

A closeout inspection of Haven Point Inn and Gallery, LLC was completed on January 10, 2023. No alcohol is on the premise; a bulk transfer permit is not applicable. License No. 4784 a Class B Wine Shop and Lounge (WSAL), Wine License was surrendered. The license holder voluntarily surrendered the license before its expiration date. A refund will be granted per Annotated Code of Maryland, Alcoholic Beverages 24-1408.

This transaction will be recorded in the monthly report of retail license activity required by the Comptroller of Maryland, Field Enforcement Division.



**BOARD OF LICENSE COMMISSIONERS OF KENT COUNTY,
MARYLAND**

Kent Alcohol and Tobacco Enforcement
400 High Street, Chestertown, MD 21620
Office: 410-810-2212 ■ Cell: 443-282-5785

Inspection Report Type: Routine

Follow-Up Type:

Date and Time: January 10, 2023 10:36 AM

Name of Establishment: Haven Point Inn and Gallery

Address: 20748 Rock Hall Avenue

City, State, Zip: Rock Hall, MD
21661

Phone Number: 410-639-4184

License No.: 4784

License Types: B, WSAL

TIPs Certified Person on Premise at Time of Inspection: Yes

Absentee Log Filled:

Comment:

Licenses Publicly Displayed:

Alcohol License: Yes

Comment:

Fire Marshal Load

Comment:

Capacity: N/A

Kent County Health Department Food Service Facility License:
N/A

Comment:

**Maryland Sales & Use Tax
License:** No

Comment: No Alcohol on
site/ surrendered license

Maryland Traders License:
No

Comment: Surrendered
alcohol license

Keg Registration: N/A

Comment:

Taps Properly Labeled: N/A

Comment:

Dispensing System Cleaned Every 7 Days: N/A

Comment:

Dispensing System Cleaning Records Properly Maintained: N/A

Comment:

Financial Records Maintained for 2 Years:



**BOARD OF LICENSE COMMISSIONERS OF KENT COUNTY,
MARYLAND**

Kent Alcohol and Tobacco Enforcement
400 High Street, Chestertown, MD 21620
Office: 410-810-2212 ■ Cell: 443-282-5785

Alcohol: Yes	Comment:
Food: N/A	Comment:
Alcohol Awareness Training Records: No	Comment: Surrendered alcohol license
Interior Signage Posted Against Selling to Minors: No	Comment: Surrendered alcohol license
Exterior Signage Posted Against Drinking in Parking Lot: No	Comment: Surrendered alcohol license
Prohibited Hours Posted (2 am - 6 am): No	Comment: Surrendered alcohol license
Consumption After Hours: No	Comment:
<u>Storage:</u>	
On License Premise: Yes	Comment:
Controlled Storage: No	Comment: Surrendered alcohol license
Off-Premise Storage Permit: N/A	Comment:
Does There Need to Be a Follow-Up?: No	
Notations/Warnings: Surrendered alcohol license/ no alcohol on site	
Violations: None	
Email: havenpointinn@gmail.com	
Verify Email Address: haveenpointinn@gmail.com	
Licensee/Employee Name (Print): Judith Miller	
Signature:	

A handwritten signature in cursive script, appearing to read "Judith Miller".

Inspector Name (Print): Bonnie Pearsall



**BOARD OF LICENSE COMMISSIONERS OF KENT COUNTY,
MARYLAND**

Kent Alcohol and Tobacco Enforcement
400 High Street, Chestertown, MD 21620
Office: 410-810-2212 ■ Cell: 443-282-5785

Signature:

A handwritten signature in black ink, appearing to be "J. J. [unclear]", written in a cursive style.



RECEIVED

JAN 10 2023

No 4784

STATE OF MARYLAND
KENT COUNTY COMMISSIONER'S OFFICE
ALCOHOLIC BEVERAGE LICENSE
BOARD OF LICENSE COMMISSIONERS OF KENT COUNTY

CLASS A

Beer, Wine, Liquor _____
Beer and Wine _____
Beer _____
Wine _____
Extended Privilege (EXPR) _____
BWLT-Tasting:
Beer, Wine, Liquor _____
Beer and Wine _____
Beer _____
Wine _____

CLASS B

Beer, Wine, Liquor _____
Beer and Wine _____
Beer _____
Bed and Breakfast (BWL) _____
Country Inn (BWL) _____
Brewery (B) _____
Wine Shop and Lounge (W) X _____
Caterer's Privilege (CP) _____
Corkage Privilege (CKP) _____
Extended Privilege (EXPR) _____

CLASS C

Beer, Wine, Liquor _____
Corkage Privilege (CKP) _____
CLASS D
Beer, Wine, Liquor _____
Beer _____
Brewery (B) _____
Extended Privilege (EXPR) _____

THEATER VENUE

Beer, Wine, Liquor _____

This is to certify that:Paul R. Miller, Member

Corporate name:

Haven Point Inn and Gallery, LLC

is licensed by the STATE OF MARYLAND, to keep for sale and sell alcoholic beverages for the class indicated:

T/A: Haven Point Inn and GalleryLocated: 20748 Rock Hall Avenue
Rock Hall, MD 21661

This license is issued under Authority of the Alcoholic Beverages Article of the Annotated Code of Maryland.

This license continues in force, unless revoked or suspended, until the last day of the month, **April 2023**Cost of license: \$300.00 Issued the 29th day of April, 2022 Registration No. 15254519

Kent County Chief Finance Officer

Revised 11/21

A license holder shall frame the license under glass and display the license conspicuously in the licensed premises.



Bonnie S. Pearsall, Inspector, Kent Alcohol and Tobacco Enforcement
1/24/2023
County Commissioners Meeting

Item Summary:

License Modification Application

ATTACHMENTS:

Description



Bonnie S. Pearsall, Inspector, Kent Alcohol and Tobacco Enforcement
1/24/2023
County Commissioners Meeting

Item Summary:

Resolution 2023-01, Tasting and Sampling

ATTACHMENTS:

Description

01.24.2023 Resolution 2023-01 A Resolution for the Alcoholic Beverages Manual of Rules and Regulations of the Kent County Board of License Commissioners

RESOLUTION 2023-01
COUNTY COMMISSIONERS OF KENT COUNTY, MARYLAND

A RESOLUTION FOR THE ALCOHOLIC BEVERAGES MANUAL OF RULES AND REGULATIONS OF THE KENT COUNTY BOARD OF LICENSE COMMISSIONERS

WHEREAS, the County Commissioners of Kent County, in their capacity as The Board of License Commissioners, published an Alcoholic Beverages Manual of Rules and Regulations in 1992, and have amended the Manual from time to time, most recently in 2008; and

WHEREAS, since the time of the last amendment to the Manual, the State of Maryland has recodified the State's alcoholic beverage laws, and has enacted several new laws as well as having repealed some previously existing laws; and

WHEREAS, as the result of the aforementioned codification and enactment of new State laws with respect to alcoholic beverages, the County's manual was deemed outdated and obsolete in many respects; and repealed by Resolution 2021-07 on May 25, 2021; and

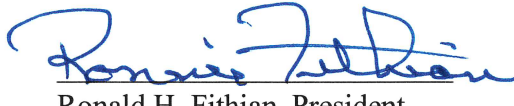
WHEREAS, the County is in the process of preparing a new manual however it is appropriate at this time to adopt language to clarify the limitations of tastings;

NOW, THEREFORE, BE IT RESOLVED, that the County Commissioners of Kent County, Maryland, as evidenced by this Resolution, hereby adopt and enact Exhibit A, effective immediately. The language will be incorporated into the Alcohol Beverages Manual of Rules and Regulations of the Kent County Board of License Commissioners at the time the Manual is reinstated.

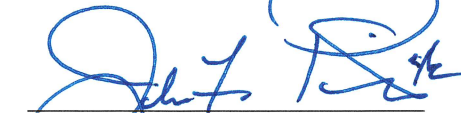
ATTEST:

THE COUNTY COMMISSIONERS
OF KENT COUNTY, MARYLAND


Sondra M. Blackiston, Clerk


Ronald H. Fithian, President


Albert H. Nickerson, Member


John F. Price, Member

ADOPTED: January 24, 2023

Exhibit A

Kent County's Beer, Wine, and Liquor License

24-1304. BWLT license

- (a) Established. -- There is a beer, wine, and liquor tasting (BWLT) license.
- (b) Authorized holder. -- The Board may issue the license to a holder of a Class A license.
- (c) Scope of license. -- The license authorizes the holder to allow the on-premises consumption for tasting of:
 - (1) beer, if the underlying license of the holder is a Class A beer license;
 - (2) wine, if the underlying license of the holder is a Class A wine license;
 - (3) beer and wine, if the underlying license of the holder is a Class A beer and wine license; and
 - (4) beer, wine, and liquor, if the underlying license of the holder is a Class A beer, wine, and liquor license.
- (d) Scope of license -- Amount allowed to taste in one day. -- The license authorizes the holder to allow an individual to taste in 1 day, not more than:
 - (1) 2 ounces of beer from each offering and 6 ounces from all offerings of beer.
 - (2) 2 ounces of wine from each offering and 4 ounces from all offerings of wine; and
 - (3) one-half ounce of liquor from each offering and 1.5 ounces from all offerings of liquor.
- (e) Fee. -- In addition to a fee for any other license held by the license holder, the annual fee for a BWLT license is \$ 200.

Tasting and Sampling Rules and Regulations

The holder of a Tasting License can hold a tasting event. The tasting/sampling/offering is given to consumers at no charge. Charging a fee for tasting/sampling/offering or soliciting a gratuity, tip, or donation is prohibited. Consumption of the tasting/sampling/offering shall occur on the licensed premises and adhere to the scope of the license and its underlying license.

The applicant shall apply for the license during the filing period for renewal application between March 2 and April 1, inclusive, and on the form provided by the Board of License Commissioners. The Inspector must be notified in writing at least 7 days before any tasting event.



Procedures For Public Comment 1/24/2023 County Commissioners Meeting

ATTACHMENTS:

Description

Press and Public Comments 2022

01.24.23 Public Comment Sign In Sheet

Press and Public Comments

Time is allotted at the beginning and end of each meeting for the Commissioners to receive comments from the public. Anyone interested in speaking must sign up on the provided The Public Comment sign-up sheet is located on the table inside the meeting room.

The President of the Board will call the names of the listed individuals when it is time to speak. When making comments, individuals are asked to speak slowly, clearly, and concisely. Precede all comments with your name and address and speak only on the subject under discussion.

Comments in writing are welcomed and should be given to the staff after your presentation. Any person making personal, impertinent, or slanderous remarks, or whose speech or actions become disruptive, will be asked to leave the meeting.

Interested parties may address the Commissioners in writing at any time about any matter pertaining to County business. Written statements can be hand-delivered or mailed to:

The County Commissioners of Kent County, Maryland
400 High Street
Chestertown, MD 21620

**PUBLIC COMMENTS
SIGN IN SHEET
January 24, 2023**

NAME (please print)	ADDRESS	TOPIC



American Rescue Plan Act (ARPA) Funds Spend Plan 1/24/2023 County Commissioners Meeting

ATTACHMENTS:

Description

1-10-2023 ARPA Fund Commissioner Report

AMERICAN RESCUE PLAN ACT FUND
AS OF COMMISSIONER MEETING MINUTES DATED
1/10/2023

Project	Department	Project Estimate	Date Approved	Amount Approved	Date Completed
Feed the Elderly Year 1	Local Management Board	112,800	08/31/21	112,800	
Feed the Elderly Year 2 and 3	Local Management Board	204,115	03/08/22	204,115	
Clariflocculator Replacement Project	Water & Wastewater Fund	275,000	08/31/21	275,000	6/28/2022
Clariflocculator Replacement Project Change Order #1		2,817	01/11/22	2,817	6/28/2022
Clariflocculator Replacement Project Change Order #2		90,642	01/11/22	90,642	11/23/2022
AV System	Information Technology	67,429	10/26/21	67,429	
IT Software	Information Technology	27,095	10/26/21	27,095	
Neighborhood & Infrastructure Grants	Information Technology	262,227	12/14/21	262,227	
A/V Equipment in EOC	Emergency Operation Center	14,087	02/01/22	14,087	
SCADA Pump Station Monitoring	Water & Wastewater Fund	110,065	02/08/22	110,065	
Millington/RT301 Wastewater Treatment Feasibility Study	Water & Wastewater Fund	57,500	02/08/22	57,500	
Millington/RT301 Wastewater Conveyance System Capacity Study		9,500	09/27/22	9,500	
Tolchester Wastewater-Design Services Influent Screen	Water & Wastewater Fund	52,910	02/08/22	52,910	
Tolchester Wastewater - Bid Services and Const. Management		35,735	09/27/22	35,735	
Tolchester Wastewater Influent Screen Construction		652,897			
Worton WWTP Influent Lagoon Engineer Design & Bid Services	Water & Wastewater Fund	32,981	03/22/22	32,981	
Worton WWTP Influent Lagoon Engineer Const. Management		15,000			
Worton WWTP Lagoon Sludge Removal Contract		1,400,500	12/13/22	1,400,500	
Kennedyville Pump Station #2 Relocation Design	Water & Wastewater Fund	52,338	09/27/22	52,338	
Kennedyville Pump Station #2 Relocation Const. Management		Deferred			
Kennedyville Pump Station #2 Construction		Deferred			
Worton/Kennedyville GIS Water and Sewer Facilities Mapping	Water & Wastewater Fund	75,770	09/27/22	75,770	
Worton Vehicle Storage Building & site prep/lighting/heat	Water & Wastewater Fund	40,000	10/25/22	40,000	
Worton WWTP Solids Press Replacement Design	Water & Wastewater Fund	40,000.00			
Worton WWTP Solids Press Replacement Construction Management		20,000.00			
Worton WWTP Solids Press Replacement		250,000.00			
Total Amount of Funds Committed		<u>\$ 3,901,408</u>		<u>\$ 2,923,511</u>	
Amount of ARPA Funds		3,766,777		3,766,777	
Balance of ARPA Funds Remaining		<u>\$ (134,631)</u>		<u>\$ 843,266</u>	



Contingency and Use of Fund Balance Report 1/24/2023 County Commissioners Meeting

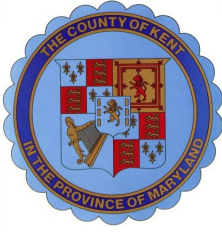
ATTACHMENTS:

Description

1-10-2023 Commissioner Report Contingency

**FY23 CONTINGENCY & USE OF FUND BALANCE
AS OF COMMISSIONERS MEETING MINUTES DATED
January 10, 2023**

[illegible]



Bill Mackey, Director, Planning, Housing and Zoning
1/24/2023
County Commissioners Meeting

Item Summary:

Appointments

The meeting was closed under the Annotated Code of Maryland, General Provisions Article § 3-305(b) (1)

To discuss the appointment, employment, assignment, promotion, discipline, demotion, compensation, removal, resignation, or performance evaluation of appointees, employees, or officials over whom this public body has jurisdiction; or any other personnel matter that affects one or more specific individuals.



Patricia Merritt, Acting Director, Human Resources
1/24/2023
County Commissioners Meeting

Item Summary:

Personnel

The meeting was closed under the Annotated Code of Maryland, General Provisions Article § 3-305(b) (1) To discuss the appointment, employment, assignment, promotion, discipline, demotion, compensation, removal, resignation, or performance evaluation of appointees, employees, or officials over whom this public body has jurisdiction; or any other personnel matter that affects one or more specific individuals.

ATTACHMENTS:

Description



Wayne Darrell, Director, Emergency Services
1/24/2023
County Commissioners Meeting

Item Summary:

Personnel

The meeting was closed under the Annotated Code of Maryland, General Provisions Article § 3-305(b) (1) To discuss the appointment, employment, assignment, promotion, discipline, demotion, compensation, removal, resignation, or performance evaluation of appointees, employees, or officials over whom this public body has jurisdiction; or any other personnel matter that affects one or more specific individuals.

ATTACHMENTS:

Description



Mike Moulds, Director, Public Works
1/24/2023
County Commissioners Meeting

Item Summary:

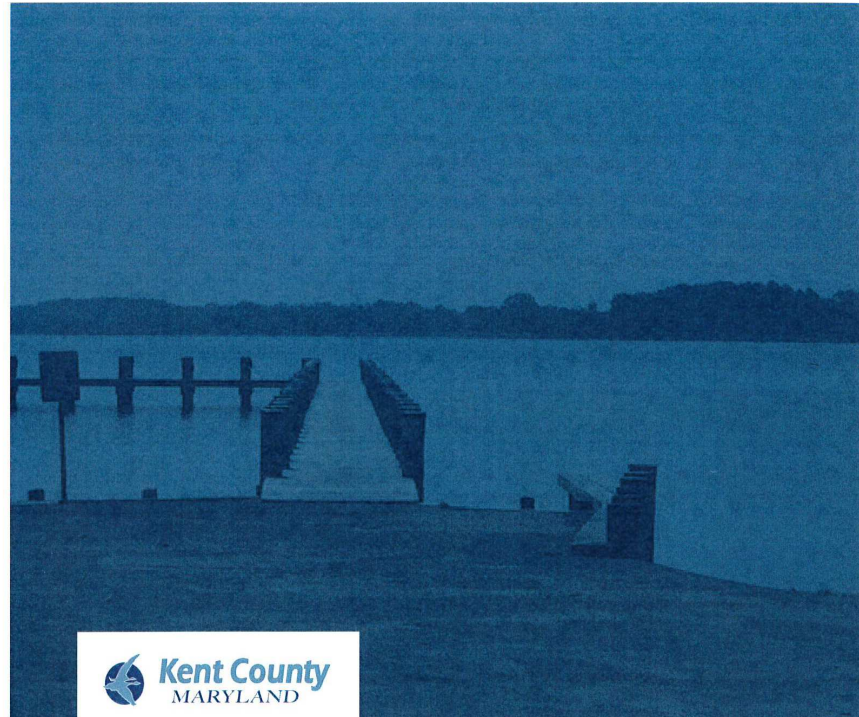
Wastewater Treatment Plant Upgrade Feasibility Study Discussion

ATTACHMENTS:

Description

01.24.2023 Study Presentation

01.24.23 Millington Wastewater Treatment Plant Upgrade Feasibility Study, Kent County Regional WWTP
Preliminary Engineering Report



KENT COUNTY REGIONAL WWTP
PRELIMINARY ENGINEERING REPORT
KENT COUNTY, MARYLAND

RISE TO THE
CHALLENGE



The Town of Millington is located on the border of Queen Anne's and Kent County, Maryland. The current WWTP is permitted for 105,000 gallons per day (GPD), and the average daily flow is 73,000 GPD. The WWTP's existing and active service area includes 274 Town equivalent dwelling units (EDUs) and 142 Kent County EDUs. The County has 79 EDUs remaining per an intermunicipal agreement with the Town of Millington. The WWTP's future service area is planned to expand in Kent County, mainly along the Route 301 and Route 291 corridor. For the purposes of this study the project service area encompasses the Town of Millington's existing service area, the existing Kent County service area, future growth areas near the Town of Millington, the existing WWTP site, and a potential site for a new WWTP.

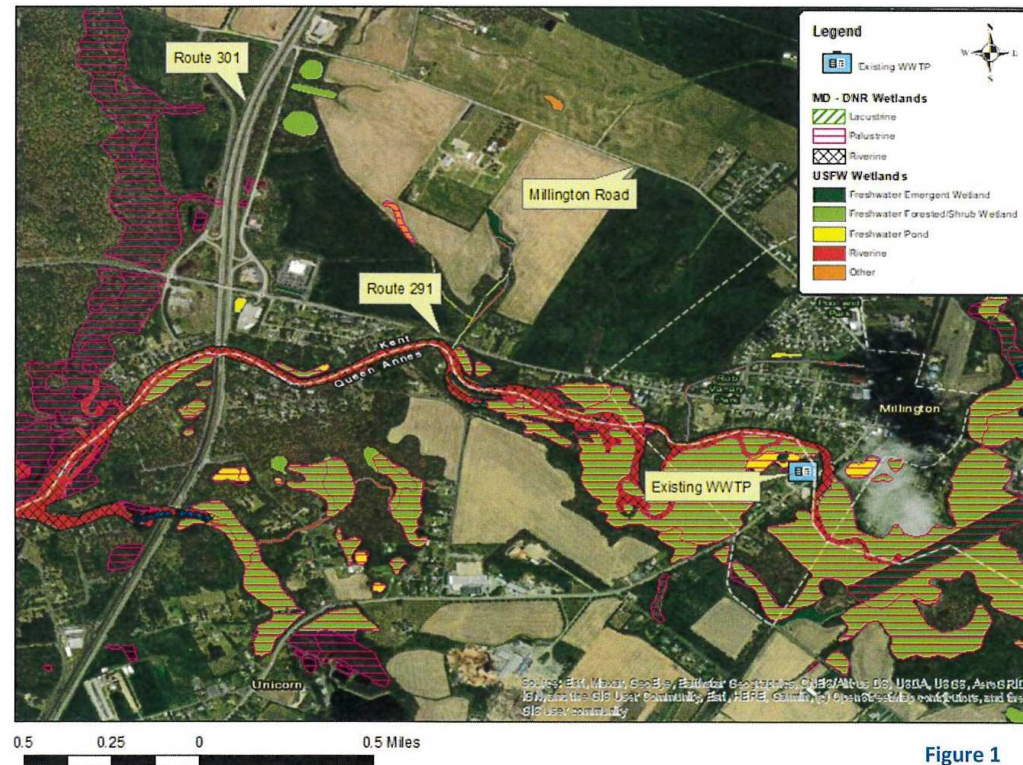


Figure 1



Population trends

In the 2018 Comprehensive Plan for Kent County, Maryland, the Town of Millington is identified as a principal residential, commercial, and business center. As such, the Town is considered one of the best locations for future growth and development, and the County has stated support to their efforts to manage growth. Based on recent discussions with prospective developers, the development outside of the existing service area range in estimated size from 1,268 to 2,358 new EDUs. Within the existing service areas of the Town and County, an additional 144 EDUs are planned.

Almost all future buildout is expected to the west of Millington along the Route 301 corridor, and between Route 291 and Millington Road. Most of this land is currently zoned for agriculture, but developers are pursuing classification changes to allow for residential and commercial usages. Possible uses include warehouses, single family homes, apartments, townhomes, business parks, and restaurants/convenience stores.

a. Location Map

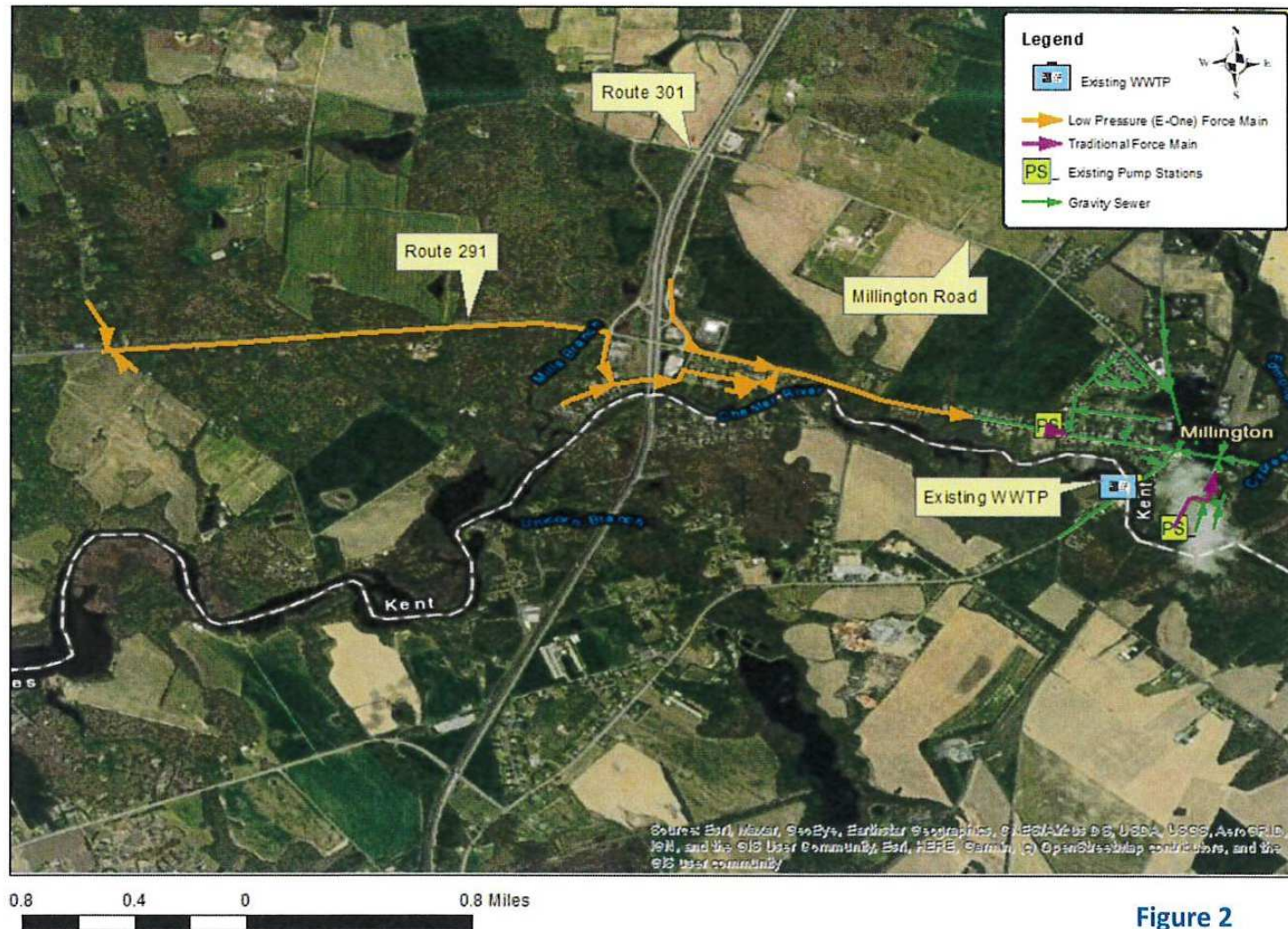


Figure 2

The existing WWTP is permitted for an average daily design capacity of 105,000 GPD and has a permitted expansion to 140,000 GPD (with additional upgrades).

Historical flow records from January 2020 through February 2022 indicate the WWTP received an average daily flow of 73,000 GPD and the highest single daily flow in that period was 321,000 GPD.

The existing facility was constructed in 1965 with upgrades made in 2002. Repairs to the plant were made in 2012 following a 2010 flooding event. Mechanical and electrical components typically have a 20 year service life. As a result, it is expected that significant investment will be needed to replace equipment if the existing plant is to continue operation.

The existing WWTP site is on an 8.63 acre parcel. However, most of the land is classified as wetlands with only 1.5 acres of buildable land with the majority within the 100 year flood plain.



The Maryland Department of the Environment policy follows design guidelines under the “10 State Standards for Wastewater Facilities”. (Section 11.242) recommends using actual flow data to the extent possible to estimate flow needs for existing users.

There are 416 total active EDU’s served at this time. This equates to approximately 175 gpd/EDU.

The 10 State Standards for Wastewater Facilities (Section 11.243) also recommends designing new flow based on an average daily flow of 100 gpd per capita plus flow from industrial, commercial, and institutional sources. There is an average of 2.15 persons per household in Kent County, MD per the most recent Census data. Planning future use is based on 10 State Standards (Section 11.243) of 100 gpd per capita and a conservative addition for non-residential flow, resulting in an estimate of 250 gpd/EDU

Based on 250 gpd per EDU for future planned connections and combining the flow from existing users, the combined total capacity need ranges from 389,950 to 662,500 GPD after build out.

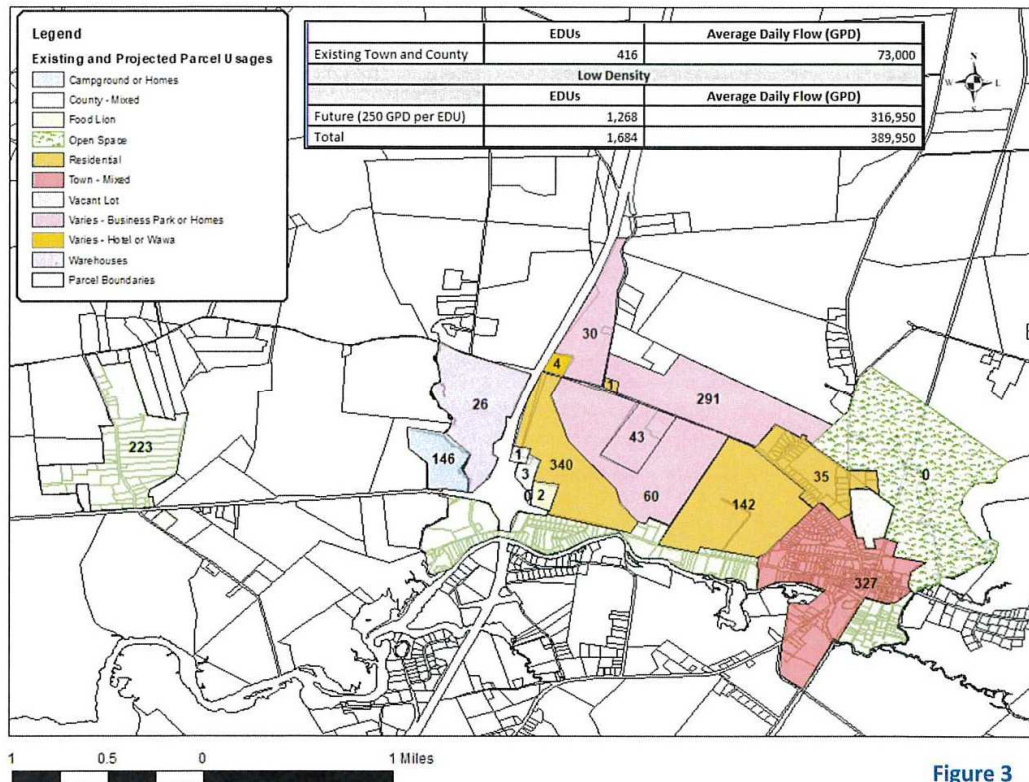


Figure 3

Table 2 – Flow Projections

	2022	2025	2030	2035	2040	2050
Existing Town of Millington and Kent County Users	416	416	416	416	416	416
Existing Flow (GPD)	73,000	73,000	73,000	73,000	73,000	73,000
Proposed EDUs	-	20	330	960	1,290	2,144
Additional Proposed Flow (GPD)	-	5,000	82,500	240,000	322,500	536,000
Total WWTP EDUs	416	436	746	1,376	1,706	2,560
Total Proposed Average Daily Flow (GPD)	73,000	78,000	155,500	313,000	395,500	609,000



Table 5 – Summary of Future Effluent Limits

	Total Nitrogen	Total Phosphorus
ENR Standards (mg/L)	3.0	0.3
Discharge Permit Max Annual Load (lb/d)	9.0	1.25
Highest Permitted ADF at ENR Standards (GPD)	366,000	500,000

Based on this analysis, the long-term wastewater capacity needs will exceed the allowable discharge to the Upper Chester River using the current limit of technology. To accommodate additional growth beyond the surface water discharge limits, the Town and County will need to utilize alternative discharge/beneficial use methods such as spray/drip irrigation or similar.

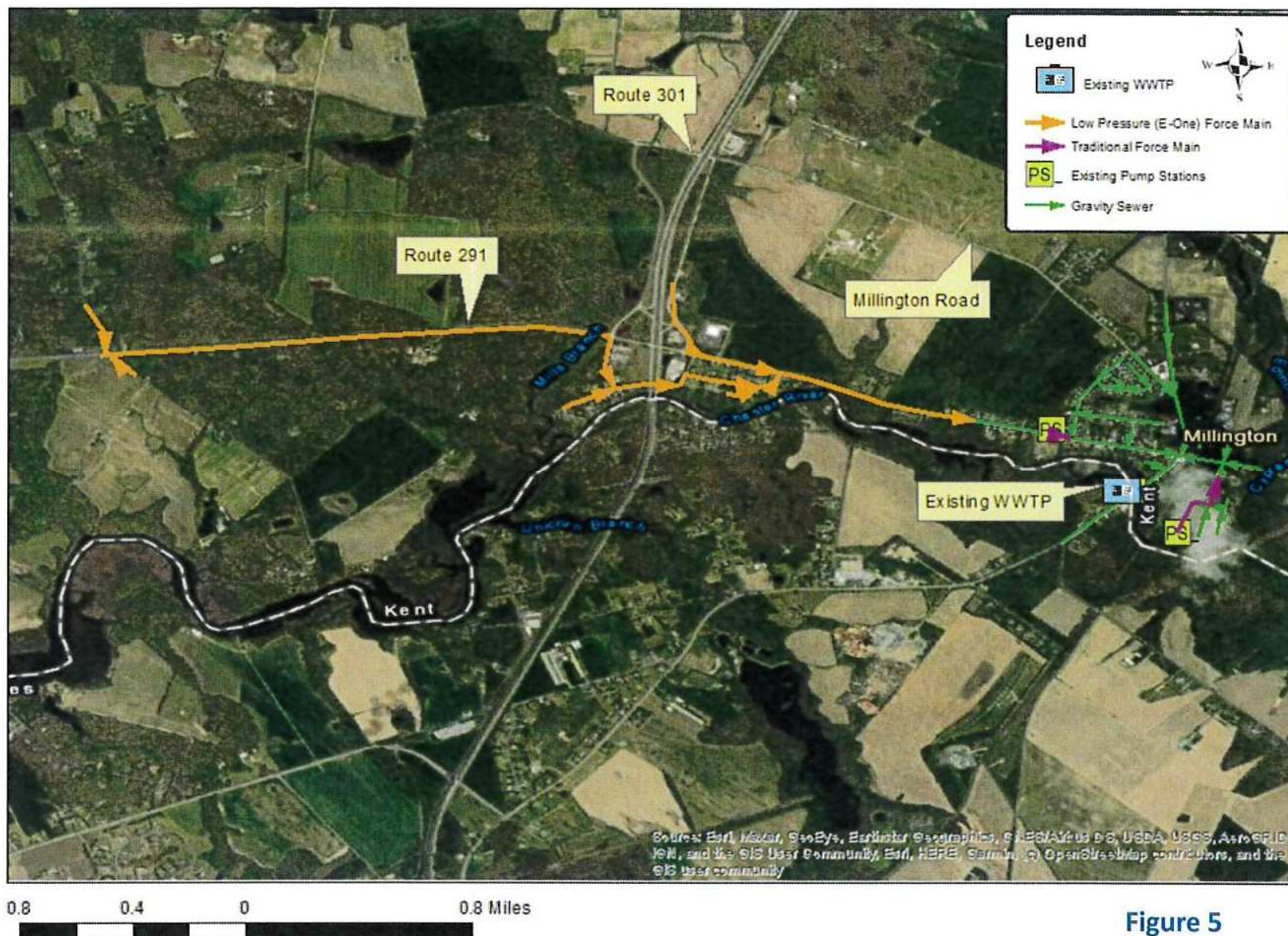
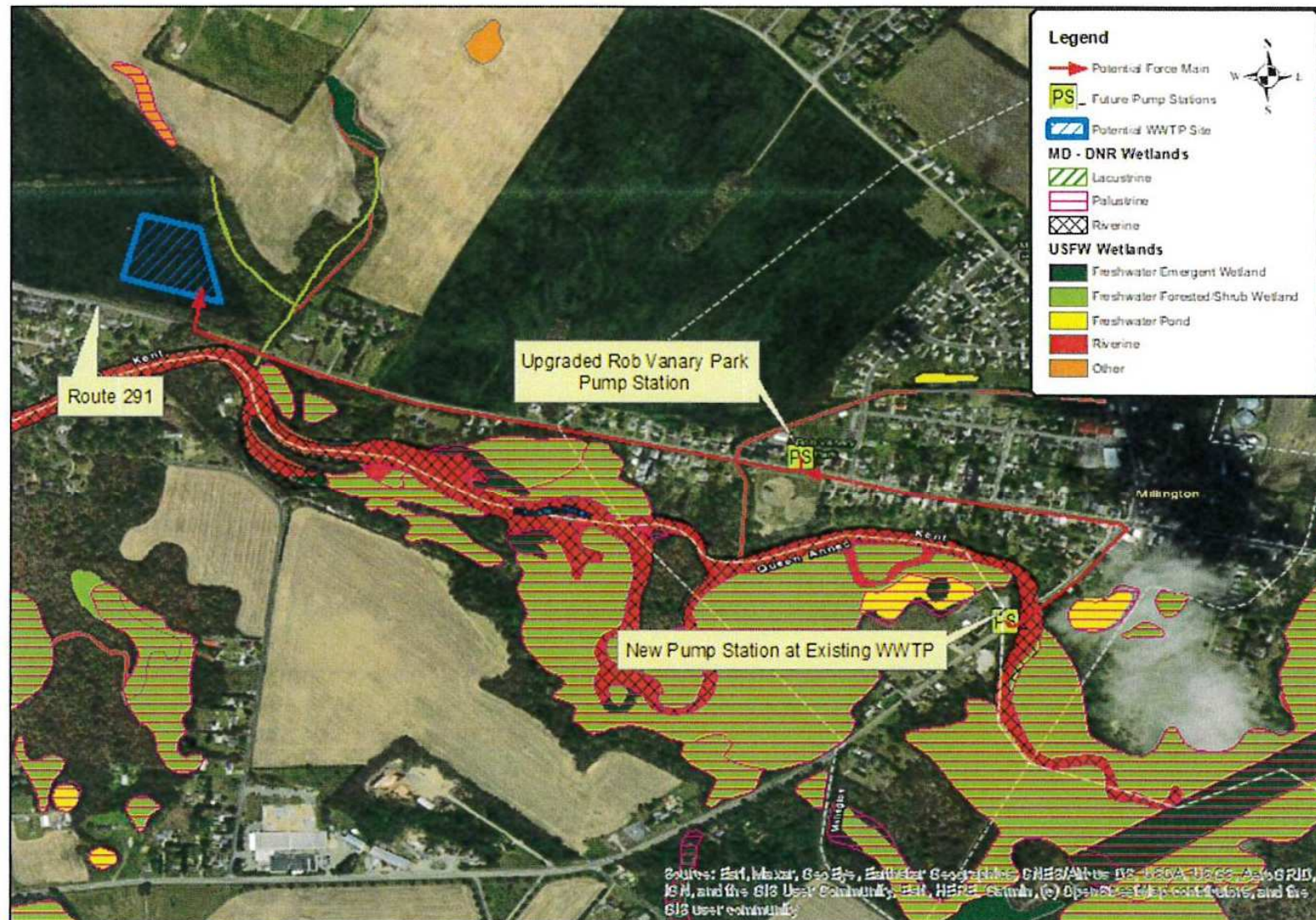


Figure 5



0.3 0.15 0 0.3 Miles

Figure 4

Table 6 – Upgrades at Existing Rob Vanary Park PS Cost Estimate

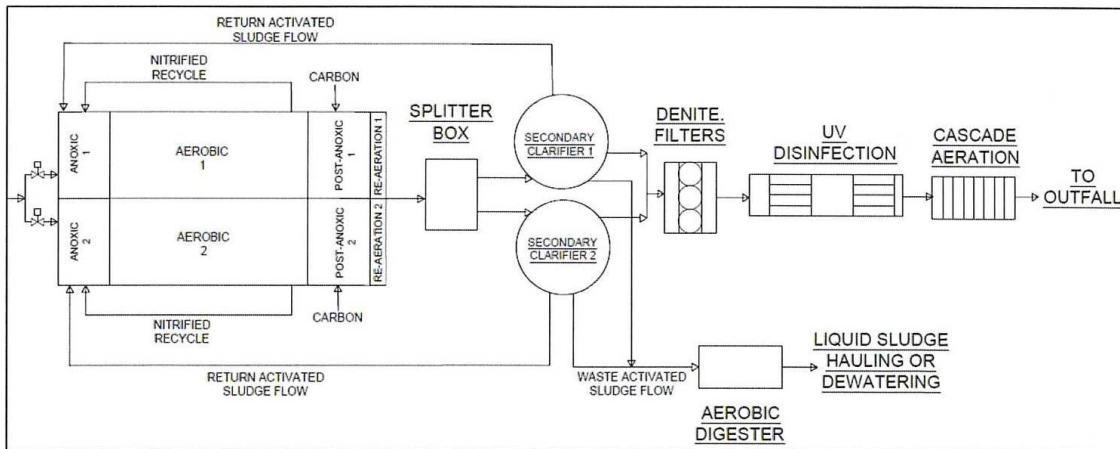
Upgrades at Existing Rob Vanary Park PS		
Valves & Piping	\$	30,000.00
Pumps and Controls	\$	70,000.00
Site Work	\$	40,000.00
Electrical	\$	45,000.00
Mobilization & Demobilization	\$	26,000.00
Temporary Facilities and Bypass	\$	40,000.00
Bypass Manhole and Pumping Connections	\$	20,000.00
100 LF of 4" PVC Force Main	\$	7,500.00
Total Construction Cost:	\$	278,500.00



Table 7 – Existing WWTP New PS Cost Estimate

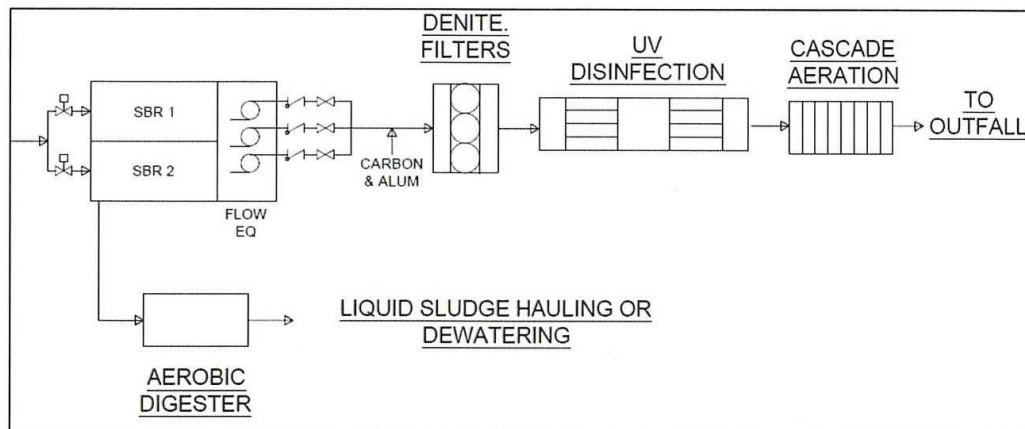
Existing WWTP New PS		
Generator & Pad	\$	25,000.00
Wet Well	\$	75,000.00
Valves & Piping	\$	30,000.00
Pumps and Controls	\$	70,000.00
Ventilation Fans	\$	25,000.00
Site Work	\$	40,000.00
Electrical	\$	45,000.00
Mobilization & Demobilization	\$	95,400.00
Temporary Facilities and Bypass	\$	80,000.00
Bypass Manhole and Pumping Connections	\$	20,000.00
6,800 LF of 6" PVC Force Main	\$	544,000
Total Construction Cost:	\$	1,049,400.00





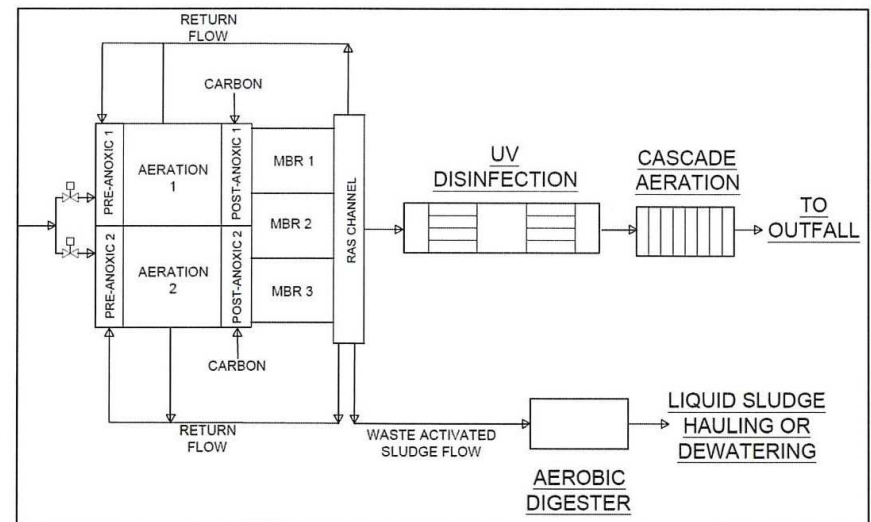
4- Stage Bardenpho

Figure 8



Sequencing Batch Reactor (SBR)

Figure 10



Membrane Bioreactor (MBR)

Figure 9

Future Expansion:

To accommodate future growth in the region, the proposed treatment facility shall be designed and constructed to facilitate expansion. The basis of design for this report assumes an initial treatment capacity of 350,000 GPD. Based on current projections, an ultimate capacity of approximately 600,000 GPD is probable. The overall site layout must accommodate future structures and equipment, as well as increase delivery and truck traffic. Most unit processes can easily be expanded modularly, but some, like the headworks, may benefit from up front capital expenditures to make future expansion feasible.

Another consideration is the cost of initial construction versus future expansion as it relates to funding and immediate capacity needs. As noted above, the existing facility continues to be at risk for flood damage and is nearing its design capacity. If the new facility is designed and constructed for significant growth, but the growth is slower than predicted, it leaves the financial burden on the existing users. In addition, some funding sources such as the ENR program are limited to existing capacity only. Any capacity expansion will decrease the percentage of the total costs which are eligible for funding. Therefore, the Town and County should seek to only build in sufficient capacity for existing needs, moderate growth, and/or capacity reserved by the development community with financial contributions.

Table 22– Alternatives Construction Cost Estimate Comparison

Item No.	Description	Costs		
New WWTP Standard Equipment		SBR	MBR	BardenPho
1	Headworks Building	\$ 209,000	\$ 209,000	\$ 209,000
2	Fine Screen	\$ 69,000	\$ 69,000	\$ 69,000
3	Grit Removal System	\$ 370,000	\$ 370,000	\$ 370,000
4	Influent Pumps, wetwell, control	\$ 250,000	\$ 250,000	\$ 250,000
4	Belt Filter Press	\$ 495,500	\$ 495,500	\$ 495,500
5	Chemical Addition	\$ 200,000	\$ 200,000	\$ 200,000
6	Concrete for Cascade Equipment	\$ 9,000	\$ 9,000	\$ 9,000
7	Concrete for Denite Equipment	\$ 108,000	\$ -	\$ 108,000
8	Concrete for Mechanical Screen	\$ 35,683	\$ 35,683	\$ 35,683
9	Concrete for Secondary Clarifiers	\$ -	\$ -	\$ 467,469
10	Concrete for UV Channel	\$ 36,000	\$ 36,000	\$ 36,000
11	Concrete Tanks (SBR, PEQ, Aerobic Holding)	\$ 1,170,000	\$ -	\$ -
12	Concrete Tanks (EQ & Aerobic Holding)	\$ -	\$ 576,000	\$ 576,000
13	Concrete Tanks for MBR Processes	\$ -	\$ 360,000	\$ -
14	Concrete Tanks for 4-Stage Bardenpho Processes	\$ -	\$ -	\$ 757,600
15	Denite Equipment	\$ 837,520	\$ -	\$ 837,520
16	Aerobic Holding Tank Equipment	\$ 414,835	\$ 414,835	\$ 414,835
17	Flow Equalization Equipment	\$ 320,385	\$ 320,385	\$ 320,385
18	Aqua SBR	\$ 764,230	\$ -	\$ -
19	Kubota MBR	\$ -	\$ 1,975,000	\$ -
20	4-Stage Bardenpho Process & Clarifier Equipment	\$ -	\$ -	\$ 1,723,000
21	Process and Control Building	\$ 950,000	\$ 950,000	\$ 950,000
22	Effluent Pump Station & Force Main	\$ 325,000	\$ 325,000	\$ 325,000
23	Equipment Buildings	\$ 340,000	\$ 340,000	\$ 340,000
24	Site Piping	\$ 500,000	\$ 500,000	\$ 500,000
25	UV Disinfection	\$ 235,000	\$ 235,000	\$ 235,000
	Subtotal	\$7,639,153	\$7,670,403	\$9,228,992
Conveyance System Improvements				
27	Demolition and Renovation at Existing WWTP	\$ 300,000	\$ 300,000	\$ 300,000
28	Pumps, Controls, Renovations of Rob Vanary Park PS	\$ 271,000	\$ 271,000	\$ 271,000
29	New Pump Station at Existing WWTP Site	\$ 505,400	\$ 505,400	\$ 505,400
30	New Force Main (6" PVC)	\$ 544,000	\$ 544,000	\$ 544,000
31	New Force Main (4" PVC)	\$ 7,500	\$ 7,500	\$ 7,500
	Subtotal	\$1,627,900	\$1,627,900	\$1,627,900
General				
32	Construction Stake Out (0.5%)	\$46,335	\$46,492	\$54,284
33	E&S, SW management (1%)	\$92,671	\$92,983	\$108,569
34	Paving and Restoration (2%)	\$185,341	\$185,966	\$217,138
35	Electrical/HVAC/Mechanical (15%)	\$1,390,058	\$1,394,746	\$1,628,534
36	Bonds and Insurance (1%)	\$92,671	\$92,983	\$108,569
37	Mob and Demob (4%)	\$370,682	\$371,932	\$434,276
38	Contingency (25%)	\$2,316,763	\$2,324,576	\$2,714,223
	Total Construction	\$13,761,574	\$13,807,980	\$16,122,485

Table 23 – Proposed Project Cost Estimate

Item No.	Description	Quantity	Unit	Unit Cost, \$		Total
				Material	Labor	
New WWTP Standard Equipment						
1	Headworks Building	1100	SF	\$ 120	\$ 70	\$ 209,000
2	Fine Screen	1	EA	\$ 53,000	\$ 16,000	\$ 69,000
3	Concrete for Mechanical Screen	40	CY	\$ 500	\$ 400	\$ 35,683
4	Grit Removal System	1	EA	\$ 330,000	\$ 40,000	\$ 370,000
5	Influent Pumps, wetwell, control	1	LS	\$ 150,000	\$ 100,000	\$ 250,000
6	Equipment Buildings	4000	SF	\$ 40	\$ 45	\$ 340,000
7	UV Disinfection	1	EA	\$ 135,000	\$ 100,000	\$ 235,000
8	Concrete for UV Channel	40	CY	\$ 500	\$ 400	\$ 36,000
9	Belt Filter Press	1	EA	\$ 415,500	\$ 80,000	\$ 495,500
10	Site Piping	1	LS	\$ 200,000	\$ 300,000	\$ 500,000
11	Effluent Pump Station & Force Main	1	LS	\$ 200,000	\$ 125,000	\$ 325,000
12	Aqua SBR	1	LS	\$ 514,230	\$ 250,000	\$ 764,230
13	Post Equalization Equipment	1	LS	\$ 220,385	\$ 100,000	\$ 320,385
14	Aerobic Holding Tank Equipment	1	LS	\$ 314,835	\$ 100,000	\$ 414,835
15	Concrete Tanks (SBR, PEQ, Aerobic Holding)	1,300	CY	\$ 500	\$ 400	\$ 1,170,000
16	Denite Equipment	1	LS	\$ 707,520	\$ 130,000	\$ 837,520
17	Concrete for Denite Equipment	120	CY	\$ 500	\$ 400	\$ 108,000
18	Concrete for Cascade Equipment	10	CY	\$ 500	\$ 400	\$ 9,000
19	Chemical Addition	1	LS	\$ 120,000	\$ 80,000	\$ 200,000
20	Process and Control Building	1	LS	\$ 600,000	\$ 350,000	\$ 950,000
				Subtotal		\$7,639,153
Conveyance System Improvements						
21	Demolition and Renovation at Existing WWTP	1	LS	\$ 75,000	\$ 225,000	\$ 300,000
22	Pumps, Controls, Renovations of Rob Vanary Park PS	1	LS	\$ 150,000	\$ 121,000	\$ 271,000
23	New Pump Station at Existing WWTP Site	1	LS	\$ 300,000	\$ 205,400	\$ 505,400
24	New Force Main (6" PVC)	6,800	LF	\$ 35	\$ 45	\$ 544,000
25	New Force Main (4" PVC)	100	LF	\$ 30	\$ 45	\$ 7,500
				Subtotal		\$1,627,900
General						
26	Construction Stake Out	0.5%			\$46,335	
27	E&S, SW management	1%			\$92,671	
28	Paving and Restoration	2%			\$185,341	
29	Electrical/HVAC/Mechanical (15%)	15%			\$1,390,058	
30	Bonds and Insurance (1%)	1%			\$92,671	
31	Mob and Demob (4%)	4%			\$370,682	
32	Contingency	25%			\$2,316,763	
				Total Construction	\$13,761,574	
				Subtotal	\$13,761,574	
33	Legal, Admin, Engineering, Design	10%			\$1,376,157.42	
34	Bidding, Construction Review, Inspection	5%			\$688,078.71	
				Total Project Cost		\$15,825,810

Section 7 - Implementation

There are several funding sources traditionally available for this type of WWTP project. State and Federal opportunities include ENR funding, BRIC funding, and USDA affordability funding. All available funding sources should be considered during future planning. Additionally, developer contributions is recommended to fund the majority of the proposed project because the new WWTP is being upgraded in size to accommodate their plans. Based on the considerable facility size increase proposed, and as most new flows are from the potential developer sites, it is recommended that approximately 2/3 of the total costs be contributed by developers. This ratio is in line with the future ratio between the existing Town and Kent County service area and the future areas to be developed. The new WWTP will be sized to serve approximately 1,400 EDUs (at 250 GPD each), and just 521 of those EDUs will be from the existing Town and Kent County service area. Based on the cost estimate previous provided, the total project cost equals out to approximately \$11,400 per EDU.

The Town and County should attempt to secure additional grant and low interest loan funding to keep the impact to existing users to a minimum. It is likely that the project would be eligible for ENR grant funding through the Bay Restoration Fund. However, this funding is limited to existing users. Eligible expenses are prorated by the ratio of existing to proposed capacity. The current project approach would result in approximately 30% prorated grant funding for eligible items. However, not all treatment upgrades will be eligible, so the total grant funding will likely be 20-25% of the total project costs. Alternate phasing plans may be considered to improve this percentage. In addition to ENR grant funding, other sources such as USDA and FEMA BRIC funding to help further offset the cost to existing users (and total users).

ENR – Enhanced Nutrient Reduction BRIC – Building Resilient Infrastructure and Communities

User rate for the sewer service provided are recommended to be reviewed and adjusted as needed to account for the changes in O&M costs and debt service (capital costs) to fund this size of project. The new WWTP will serve more than three times the number of customers as the existing WWTP during the initial phase. User rates should be periodically monitored and reviewed as the new WWTP grows and more customers are added to its service area.

The proposed project timeline greatly depends on the action of local developers to have available sewer service and the finalization of a WWTP site selection. The actual date that each phase of the proposed project is completed will vary, as previously discussed, but the general time for completion of each phase is provided below. This timeline is based on similarly sized WWTP projects undergoing similar upgrades. In total, it is estimated that the total proposed project time will take 3 years and 9 months to complete. This includes the design and engineering phase, permitting and funding phase, bid phase, and construction of the entire proposed project. Portions of the conveyance system upgrades could be completed independently of the new WWTP if the site location becomes finalized early on that may speed up and streamline schedules.



Going Forward

MOU between County and Town
Assignment of Remaining WWTP Capacity
Zoning Changes
Town Annexation
Secure WWTP Site
Amendment to Comprehensive Water and Sewerage Plan
Allocation Policy
Developer Commitment Agreements
County and Town Sewer Agreement
Design Contract
Assessment of Water System
Assessment of County Sewer System
Establishment of Development Water and Sewer Standards
Funding applications
Permit Approvals
Operating Budget and Rate Review
Bidding
Secure Financing
Contract Award
Construction
Start up and Availability of Capacity

MILLINGTON WWTP FEASIBILITY STUDY

Intermunicipal Agreement

Millington	339 EDU's	84,750 gallons per day	Based on 250 gpd/EDU
County	221 EDU's	55,250 gallons per day	
Total	560 EDU's	140,000 gallons per day	

Note agreement based on a 140,000 gpd capacity.
NPDES Permit capacity is 105,000 gpd without upgrades.

Current Wastewater Flows

Current Total Connections	416 EDU
WWTP Permitted Hydraulic Capacity	105,000 gpd
3- year Average Daily Flow	<u>73,000 gpd</u> - /416 EDU's ± 175 gpd/EDU
Remaining capacity	<u>32,000 gpd</u> /250 gpd/EDU = 128 EDU's

Current Contributions

	EDU's	Flow
	<u>Active</u>	Based on 175 gpd/EDU
Millington	274	48,050
County	<u>142</u>	<u>24,950</u>
	416	73,000

County has 79 EDUs Remaining in the Intermunicipal Agreement (221 allocated to County – 142 current EDUs)

57 of the 79 have been reserved/purchased. County has 22 unallocated EDUs available.

49 EDUs remain unallocated for Millington. (128 – 79 = 49)

Proposed Future Connections (128 total remaining @ 250 gpd/EDU planning level)

<u>Millington</u>	<u>EDU's</u>	<u>GPD</u>	<u>County</u>	<u>EDU's</u>	<u>GPD</u>
Infill Residential Lots	8	2,000	Unconnected Homes	24	6,000
Senior Housing Project	40	10,000	Vacant Lots	33	8,250
Elementary School	<u>5</u>	<u>1,250</u>	Warehouses	<u>34</u>	<u>8,500</u>
	53	13,250		91	22,750
	<u>-49</u>			<u>- 79</u>	
	4			12	
Initial Planned Demand	Total	<u>36,000 GPD</u>			
			144 EDU's	@250gpd/EDU	

County needs additional 12 EDUs above current allocation. Town needs 4 EDU's

Total Requested Capacity = 109,000 gpd which exceeds current plant capacity by 4,000 gpd (if 250 gpd/edu required)

Proposed Initial Expansion Capacity

350,000 gpd
 73,000 gpd – Existing
 13,250 gpd – Millington Proposed Future Connections
22,750 gpd – County Proposed Future Connections
 241,000 gpd – Remaining @ 250gpd/EDU = 964 EDU's



Thank
You

*County Commissioners
Millington Mayor and Council
Jo Manning
KCI Engineering
Russ Richardson*



KENT COUNTY REGIONAL WWTP PRELIMINARY ENGINEERING REPORT

KENT COUNTY, MARYLAND

RISE TO THE
CHALLENGE



Table of Contents

Section 1 – Project Planning

Section 2 – Existing Facilities

Section 3 – Need for Project

Section 4 – Alternatives Considered

Section 5 – Selection of Alternative

Section 6 – Proposed Project

Section 7 – Implementation

FIGURES

- Figure 1 – Environmental Resources Present
- Figure 2 – Existing Facilities
- Figure 3 - EDU Projection
- Figure 4 – Proposed Conveyance System and Environmental Resources
- Figure 5 – Existing Conveyance System
- Figure 6 – Proposed Conveyance System
- Figure 7 – Diagram of Common Treatment Processes
- Figure 8 – 4-Stage Bardenpho Process Diagram
- Figure 9 – MBR Process Diagram
- Figure 10 – SBR Process Diagram
- Figure 11 – Proposed Conveyance System and Environmental Resources
- Figure 12 - Proposed Conveyance System and Flood Zones

TABLES

- Table 1 – EDU Trends
- Table 2 – Flow Projections
- Table 3 – Existing Millington WWTP BOD and TSS Limits
- Table 4 – Existing Millington WWTP Nutrient and Effluent Limits
- Table 5 – Summary of Future Effluent Limits
- Table 6 – Upgrades at Existing Rob Vanary Park PS Cost Estimate
- Table 7 – Existing WWTP New PS Cost Estimate

Table 8 – Headworks Design Summary
Table 9 – Influent Pumping Station Design Summary
Table 10 – Post Equalization Design Summary
Table 11 – UV Disinfection Design Summary
Table 12 – Effluent Pumping Station Design Summary
Table 13 – Aerobic Digester Design Summary
Table 14 – Dewatering Building Design Summary
Table 15 – Control Building Design Summary
Table 16 – 4-Stage Bardenpho Design Summary
Table 17 – 4-Stage Bardenpho Clarifier Design Summary
Table 18 – Tertiary Denitrification Filtration Design Summary
Table 19 – MBR Design Summary
Table 20 – SBR Design Summary
Table 21 – Tertiary Denitrification Filtration Design Summary
Table 22 – Alternatives Construction Cost Estimate Comparison
Table 23 – Life Cycle Analysis Variables
Table 24 – Annual O&M Cost Estimates
Table 25 – Net Present Value of Treatment Alternatives
Table 26 – Proposed Project Cost Estimate

APPENDICES

Appendix A: Potential Site Layout & Process Diagrams
Appendix B: Equipment Proposals
Appendix C: Cost Estimates
Appendix D: Existing Millington WWTP Permit
Appendix E: MES Annual Report for Millington WWTP
Appendix F: EDU and Growth Projections
Appendix G: Short Lived Asset Table

Section 1 - Project Planning

a. Location

The Town of Millington is located on the border of Queen Anne's and Kent County, Maryland. The current WWTP is permitted for 105,000 gallons per day (GPD), and the average daily flow is 73,000 GPD. The WWTP's existing and active service area includes 274 Town equivalent dwelling units (EDUs) and 142 Kent County EDUs. The County has 79 EDUs remaining per an intermunicipal agreement with the Town of Millington. The WWTP's future service area is planned to expand in Kent County, mainly along the Route 301 and Route 291 corridor. For the purposes of this study the project service area encompasses the Town of Millington's existing service area, the existing Kent County service area, future growth areas near the Town of Millington, the existing WWTP site, and a potential site for a new WWTP.

b. Environmental resources present

Environmental resources present or potentially present include wetlands and waterways throughout Town of Millington and into the surrounding areas. The Chester River is the most prominent body of water throughout the project area, with streams stretching throughout most low elevation areas. Portions of the existing treatment plant also fall within FEMA floodplain boundaries as the plant is located immediately adjacent to the Chester River.

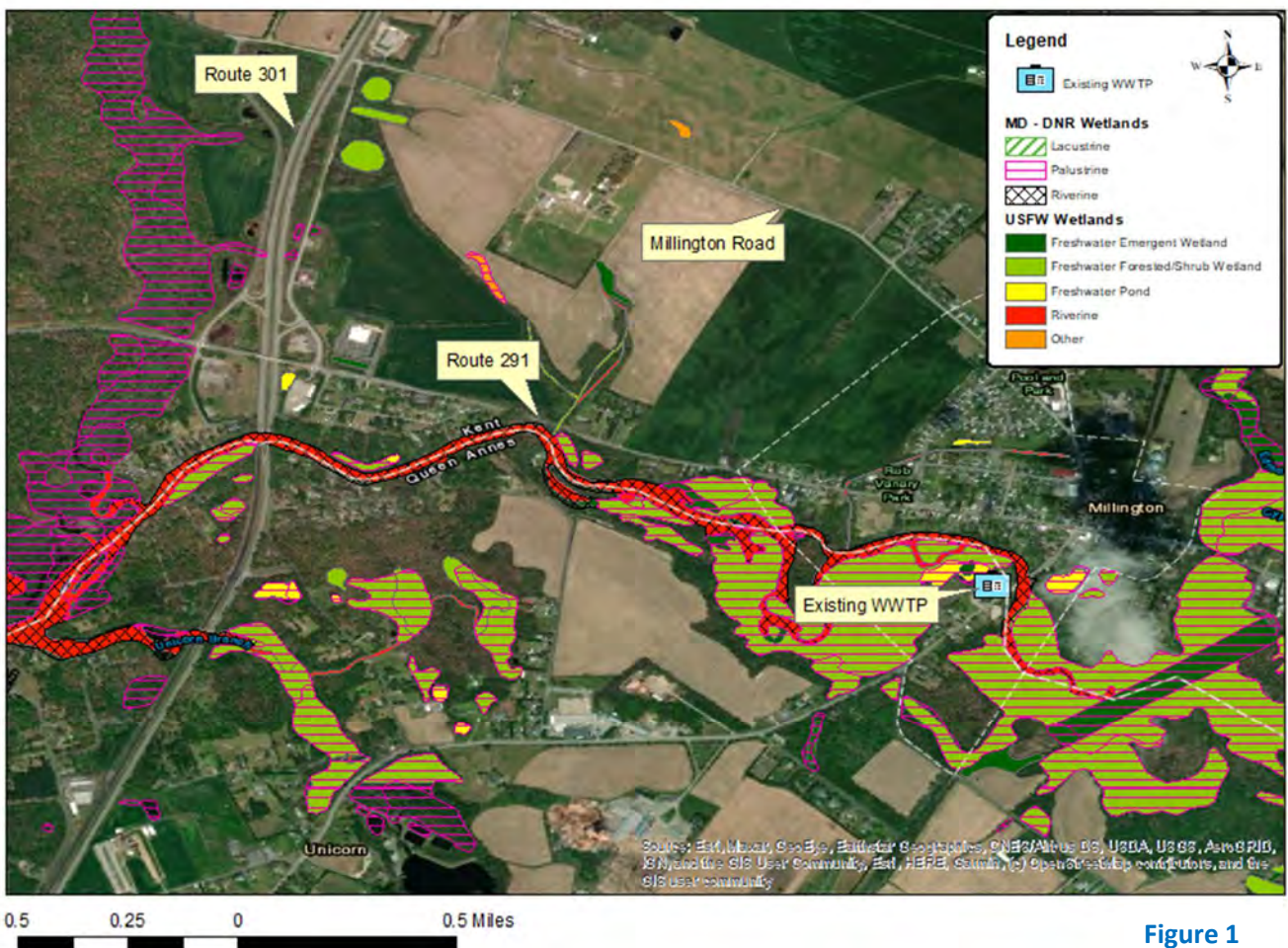


Figure 1

The Town of Millington's existing wastewater treatment plant (WWTP) is located within a floodplain, which leaves the plant open to potential flooding risks. The risks include damage to the existing buildings, mechanical equipment and electrical components, and wastewater overflow into the nearby environment. The Town has frequently experienced flooding in the past at the WWTP. Each flooding event results in significant damage and requires costly cleanup efforts. Additionally, during severe flooding events the WWTP has overflow into the nearby Chester River, with sludge from the sludge drying beds being one of the main hazards to enter the waterway. The treatment plant is also a candidate for future enhanced nutrient removal (ENR) requirements that would potentially be mandated by Maryland Department of the Environment (MDE).

There are no adverse effects expected to the environment through a relocation of the WWTP or from changes to the sewer conveyance system. The temporary impacts to air quality, transportation, and noise level due to construction activities will be mitigated by limiting the disturbed area and work hours, dust control, sediment and erosion control, and maintenance of traffic measures. However, as an exact location for the new WWTP is unknown additional consideration should be given to its placement during future designs.

c. Population trends

In the 2018 Comprehensive Plan for Kent County, Maryland, the Town of Millington is identified as a principal residential, commercial, and business center. As such, the Town is considered one of the best locations for future growth and development, and the County has stated support to their efforts to manage growth. Based on recent discussions with prospective developers, the development outside of the existing service area range in estimated size from 1,268 to 2,358 new EDUs. Within the existing service areas of the Town and County, an additional 144 EDUs are planned.

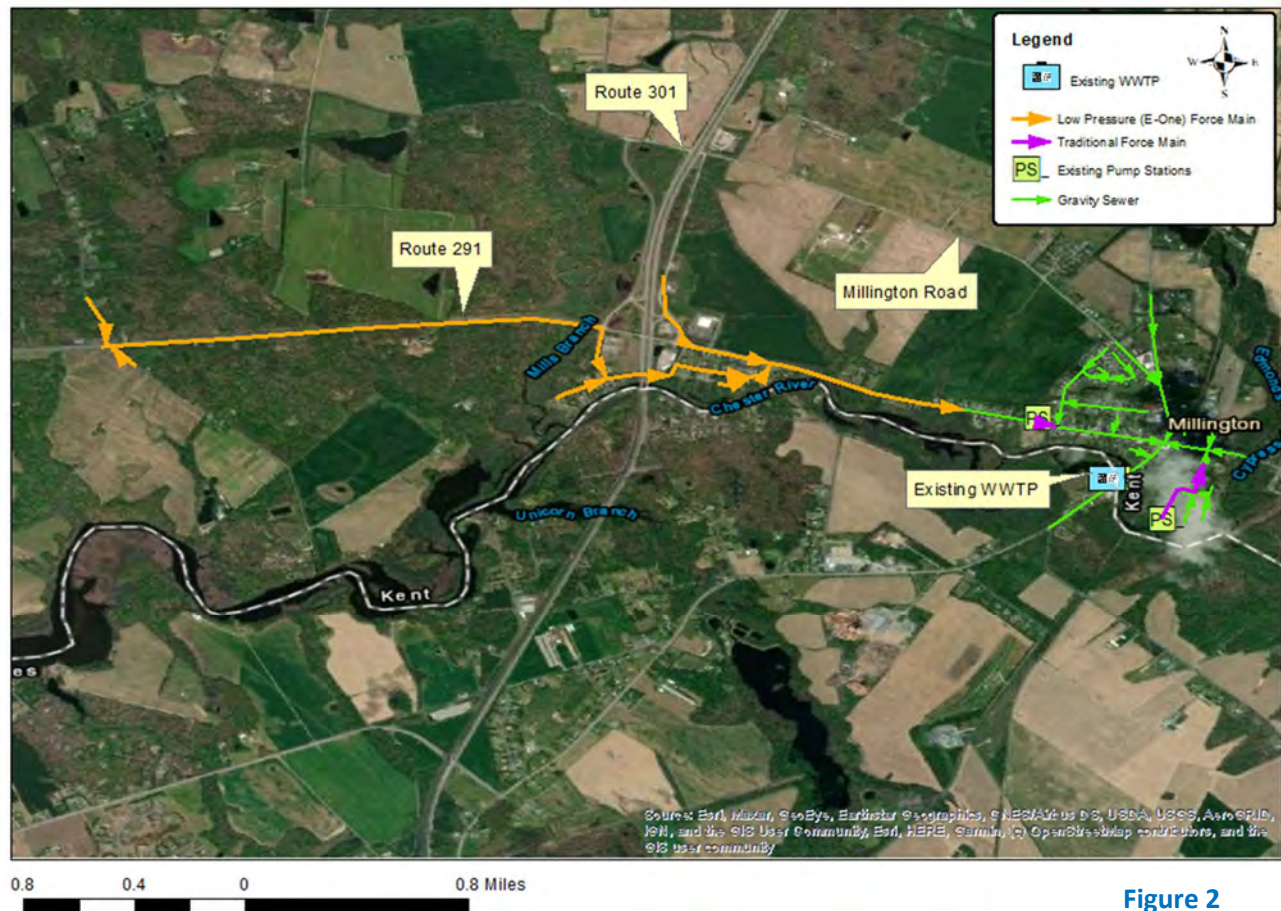
Almost all future buildout is expected to the west of Millington along the Route 301 corridor, and between Route 291 and Millington Road. Most of this land is currently zoned for agriculture, but developers are pursuing classification changes to allow for residential and commercial usages. Possible uses include warehouses, single family homes, apartments, townhomes, business parks, and restaurants/convenience stores.

d. Community engagement

Prior to the start of construction, the Town of Millington and Kent County should notify residents and businesses of any disruption to parking, traffic, or service. The Town and County should work with local businesses to ensure there is no substantial negative impact due to construction using maintenance of traffic plan visuals and scheduled phasing of work. Other community engagement opportunities include public announcements on the Town and County websites, and open public meetings to discuss the project. It is recommended to have discussions and public forums to aid discussions in the future WWTP site location.

Section 2 - Existing Facilities

a. Location Map



b. History

The Town's existing treatment plant and sewage collection system were constructed in 1965, with upgrades made to the treatment plant in 2002. The existing conveyance system to the WWTP includes gravity sewer mains, pump stations, force mains, and low-pressure force mains via E-One Grinder Pumps.

The existing treatment plant utilizes an extended aeration, activated sludge process (Biolac by Parkson Corporation) as the primary biological treatment system. The plant includes additional unit processes consisting of an influent pump station, headworks screening, sludge pumping station, disk filters, UV disinfection, and post aeration. Sludge drying beds are utilized at the plant, which were included in the upgrades in 2002. However, the roof for the drying beds was not installed and they are currently open to the elements. Dried sludge cake is sent to Midshore Landfill. The facility uses Lime for alkalinity control in the Biolac System, aluminum sulfate for solid settling and phosphorus removal, and Micro C for an extra carbon source. There have been catastrophic flood events that have occurred which caused damages to the electrical equipment, hindering the operation of the plant. In 2010 the treatment plant experienced

flooding, costing the Town approximately \$1.5 million in repairs and significant restoration work was performed. The Town contracts the operation of the WWTP to Susquehanna Operational Service (SOS).

c. Condition of Existing Facilities

(1) Permit Compliance

All effluent from the existing WWTP is discharged into the Upper Chester River. The existing WWTP is permitted for an average daily design capacity of 105,000 GPD and has a permitted expansion to 140,000 GPD (with additional upgrades). The discharge limits for the plant's monthly average concentration of BOD and TSS are 23 mg/l and 23 mg/l respectively. Disinfection requirements include Enterococci below 57 Monthly Geometric Mean Value (MPN)/100 mL and E. Coli below 126 MPN/100 mL.

Historical flow records from January 2020 through February 2022 indicate the WWTP received an average daily flow of 73,000 GPD and the highest single daily flow in that period was 321,000 GPD. Based on the 2021FY annual report prepared by Maryland Environmental Service (MES), of the 10 effluent parameters monitored over 1,100 times total, the existing facility violated the NPDES permit limitations twice for Enterococcus. The compliance rate for the existing facility in 2021FY was 99%.

(2) Condition of Facilities

As the existing treatment plant was repaired in 2012, following the 2010 flooding event, most of the components are in good condition. The electrical equipment of the existing treatment plant is currently located on the base level of the plant. The existing treatment plant is not adequately flood proofed; and attempting to retrofit flood proofing would be extremely costly.

The mechanical and electrical components of a wastewater treatment plant, such as the pumps, blower assemblies, screen units, etc. typically have a service life of 20 years. Based on the upgrades completed in 2002, it is expected that some components will be nearing the end of their useful lives this year of 2022.

(3) Site Limitations

The existing WWTP is on an 8.63-acre parcel in Queen Anne's County that borders the Chester River, Route 313, and residential properties. Despite the large size, most of the parcel is classified as a wetland and unable to be developed leaving approximately 1.5 acres of buildable land. The overall site elevation is generally flat, and slopes towards the river. The plant is located within the FEMA floodplain, and catastrophic flood events have occurred causing damage to the electrical equipment hindering the operation of the plant. A portion of the property was turned into a public park and access point to the Chester River. The ability to upgrade or expand the WWTP at this existing site is extremely limited due to the nearby wetlands and the increased flood risk.

d. Water/Energy/Waste Audits

No audits have been performed on the wastewater treatment plant at this time. The Town intends to do an infiltration and inflow (I&I) investigation at a later date to identify and resolve issues, in an effort to reduce flow rates.

Section 3 - Need for Project

a. Health Sanitation and Security

The Town and the surrounding area are anticipated to experience significant growth in the next 20 years. There is not sufficient wastewater infrastructure in place to support projected needs. Lack of well-operated sanitary sewer facilities can increase the risk of improperly treated wastewater reaching the surrounding area creating a health risk to residents and damage to the environment. As the existing WWTP site borders the Chester River, the parcel is prone to flooding which could cause damages to the electrical equipment of the plant, hinder the operation of the plant, and could result in sewage overflow. Since the existing WWTP is located within a FEMA flood zone, it can be expected that flooding will continue to occur more frequently and intensely.

b. Aging Infrastructure

Following upgrades in 2002 and repairs in 2012, due to the 2010 flooding event, many components are in fair condition. The mechanical and electrical components of a wastewater treatment plant, such as the pumps, blower assemblies, screen units, etc. typically have a service life of 20 years. Based on the upgrades completed in 2002, it is expected that some components will be nearing the end in the coming years. An overall facility assessment is recommended to confirm the critical components in need of replacement, and to develop a maintenance plan.

c. Reasonable growth

(1) Growth Potential

As noted previously in the Population Trends Section of this study, there is expected growth throughout the existing and future service area. Within the existing Town and Kent County service areas, an additional 144 EDUs are anticipated. The majority of growth is anticipated in non-incorporated areas of Kent County along the Route 291 – Route 301 corridor. There are an additional 1,268 to 2,358 EDUs anticipated from development in this growth corridor alone.

(2) Needs Analysis

As noted above, the average daily flow for the past three years was 73,000 gpd, which remains within the existing permit requirements. The 10 State Standards for Wastewater Facilities (Section 11.242) recommends using actual flow data to the extent possible to estimate flow needs for existing users. There are 416 total active EDUs served at this time, equating to approximately 175 gpd/EDU.

The 10 State Standards for Wastewater Facilities (Section 11.243) also recommends designing new flow based on an average daily flow of 100 gpd per capita plus flow from industrial, commercial, and institutional sources. There is an average of 2.15 persons per household in Kent County, MD per the most recent Census data. Planning future use is based on 10 State Standards (Section 11.243) of 100 gpd per capita and a conservative addition for non-residential flow, resulting in an estimate of 250 gpd/EDU

Based on a 250 gallon per day (GPD) per EDU for future planned connections and combining the flow produced by existing users, the combined ultimate total capacity need ranges from 389,950 to 662,500 gallons per day after buildout.

The existing WWTP is unable to serve the future growth anticipated as the existing capacity is 105,000 GPD and potential flow at ultimate buildout could be as high as 662,500 GPD. There is not enough buildable area at the existing WWTP site to locate a new, larger, WWTP. No other WWTPs are near the Town with sufficient capacity to accommodate this expansion. As the upper Chester River, and its associated streams, are listed as impaired water bodies per the 2014 Integrated Report of Surface Water Quality, it is extremely important for all wastewater to be sufficiently processed before re-entering the surrounding environments. To continue providing sewer services to existing users, and to provide safe and reliable wastewater processing of future development flows, a new WWTP needs to be constructed.

(3) Development Summary

The 2018 Kent County Comprehensive Plan has identified planned growth between the Town of Millington and the lands surrounding the Route 291-Route 301 corridor. The existing properties in this corridor are served by individual onsite grinder pumps, conveying flow to the Town's existing sewer network. There is not enough capacity in the existing sewer networks to accommodate the growth anticipated in this area. The majority of future developments will need to utilize new gravity sewer mains and force mains to convey flow to the future WWTP rather than by using the existing Town and County sewer network.

d. 2025 | 2030 | 2035 | 2040

The population to be served by the future WWTP varies based on the actual buildout that occurs. Most areas with future growth projected are currently zoned for agriculture usages. For the purposes of this study, wastewater flows were converted to equivalent dwelling units (EDUs) because a site with low populations, such as a manufacturing facility, may still produce high wastewater flows. For planning purposes, all future EDUs are assumed to conservatively produce 250 GPD of flow.

Currently, the existing WWTP serves 416 EDUs and has an average daily flow of 73,000 GPD. Buildout within the existing Town and Kent County service area is expected to result in an additional 144 EDUs. Buildout in areas surrounding the Route 291 and Route 301 corridor, outside of the existing WWTP service area, is expected to be a mix of residential, warehouse, and commercial use. Total new EDUs in this growth area are expected to range from approximately 1,268 to 2,358 EDUs based on the density of buildout. A low-density ultimate buildout scenario is summarized in Figure 3, showing the potential land use for parcels and EDUs expected various areas.

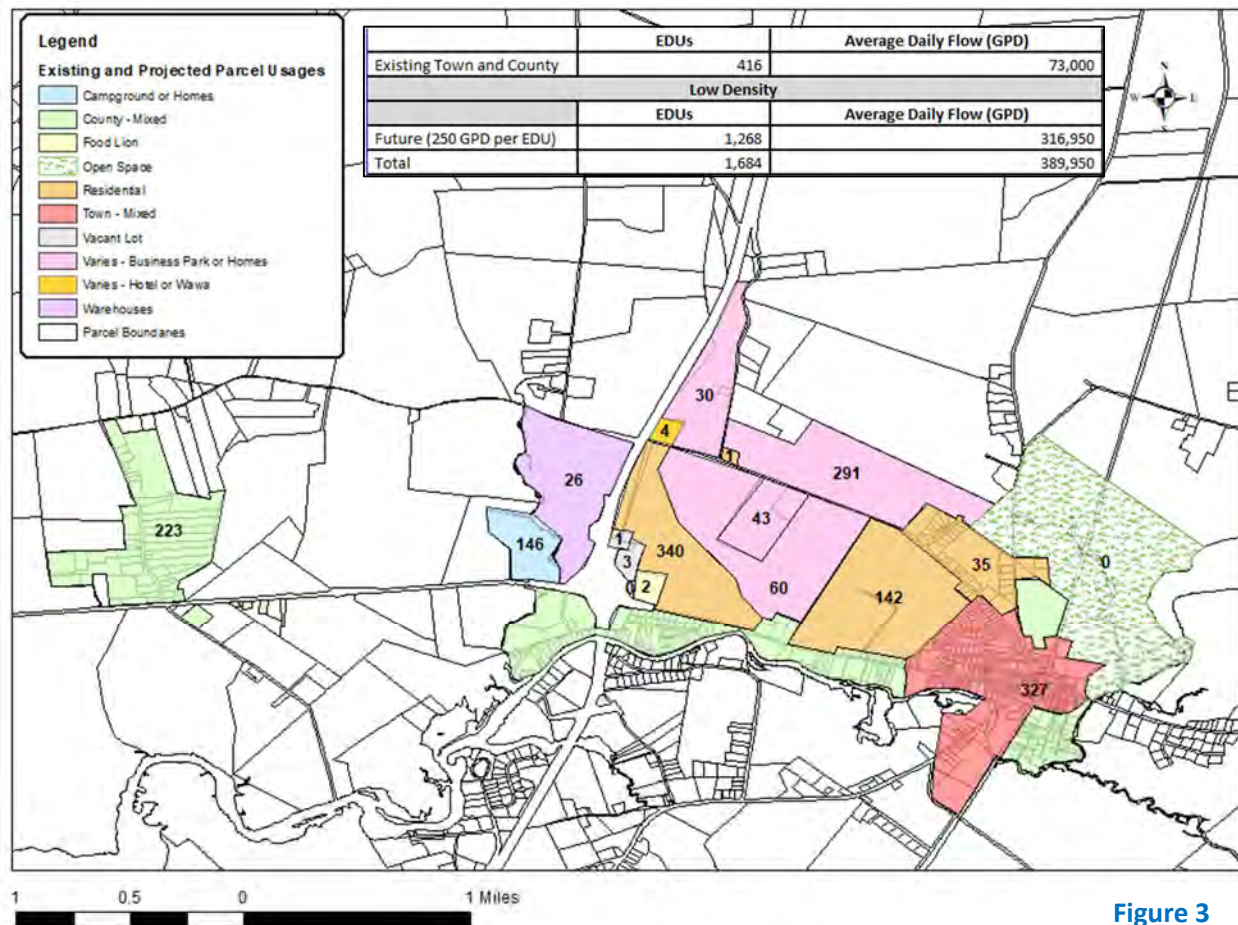


Figure 3

The table below provides an estimated buildout scenario for 2025-2050 assuming an average density buildout. The actual number of EDUs for each year presented below is unknown; this table is meant to provide a potential growth scenario for understanding when flow milestones could be reached.

Table 1 – EDU Trends

Population Trends	2022	2025	2030	2035	2040	2050
Existing Town of Millington and Kent County Users	416	416	416	416	416	416
Proposed Town of Millington and Kent County EDUs	-	10	30	60	90	144
Proposed Route 291 - Route 301 Corridor EDUs	-	10	300	900	1,200	2,000
Total Proposed WWTP EDUs	416	436	746	1,376	1,706	2,560

e. Sustainability/Flooding

There have been catastrophic flood events that caused damages to the existing WWTP's electrical equipment, hindering the operation of the plant. Due to the small amount of usable area at the existing site, flood proofing efforts are challenging. There are no other treatment plants nearby to which flow can be diverted to if needed. As climate change continues, it is

anticipated that significant flood events will continue to become more regular, and the long-term sustainability of the WWTP at its current location will be jeopardized. It is imperative that a future WWTP site takes flooding and sustainability into consideration to decrease long-term operational costs, and ensure treatment is never disrupted due to environmental factors.

f. Document Future Plant Capacity

(1) Wastewater Flow

As previously discussed in this study, the existing WWTP serves 416 EDUs with an average daily flow of 73,000 GPD. For planning purposes, all existing EDUs will be modelled based on known flows at the WWTP. All future EDUs are conservatively modelled at 250 GPD per EDU.

Table 2 – Flow Projections

	2022	2025	2030	2035	2040	2050
Existing Town of Millington and Kent County Users	416	416	416	416	416	416
Existing Flow (GPD)	73,000	73,000	73,000	73,000	73,000	73,000
Proposed EDUs	-	20	330	960	1,290	2,144
Additional Proposed Flow (GPD)	-	5,000	82,500	240,000	322,500	536,000
Total WWTP EDUs	416	436	746	1,376	1,706	2,560
Total Proposed Average Daily Flow (GPD)	73,000	78,000	155,500	313,000	395,500	609,000

(2) Discharge Permit Conditions

The current discharge permit is State Discharge Permit 15-DP-0166, and SPDES Permit MD0020435 and includes limits based on the design capacity of 105,000 GPD. The permit also includes an expansion to an expanded 140,000 GPD facility. However, the permitted effluent nutrient parameters are reduced for the expanded facility. Through discussions with MDE representatives, it was confirmed that any future facility expanding beyond 140,000 GPD permitted flow should be expected to have the same annual, monthly, and weekly loading maximum limits as those listed for the expanded facility in the existing permit.

The existing WWTP effluent discharges into the Upper Chester River Sub-Watershed, which has its own Total Maximum Daily Load requirements approved by the Environmental Protection Agency. For the purposes of this study, the effluent limitations permitted for a 140,000 GPD facility are assumed to be the discharge permit conditions for a new larger capacity facility.

Table 3 – Expanded 140,000 GPD Millington WWTP BOD and TSS Limits

	<u>Monthly Load Avg (lb/d)</u>	<u>Weekly Load Avg (lb/d)</u>	<u>Monthly Conc. Avg (mg/L)</u>	<u>Weekly Conc. Avg (mg/L)</u>
<u>BOD5</u>	26	39	23	34
<u>TSS</u>	26	39	23	34

Table 4 – Expanded 140,000 GPD Millington WWTP Nutrient and Effluent Limits

	<u>Annual Load Max (lb)</u>
<u>Total-P</u>	457
<u>Total-N</u>	3,344
	<u>Maximum (MPN/100mL, monthly mean)</u>
<u>E Coli</u>	126
<u>Enterococci</u>	57
<u>Total Residual Chlorine</u>	nondetectable (<0.1 mg/L)
<u>pH</u>	8.5
	<u>Minimum (mg/L)</u>
DO (All Year, anytime)	5
DO (All Year, month avg)	5.5
DO (2/1-5/31, week avg)	6

These permitted loadings effectively limit the total pounds and therefore volume of treated effluent which can be discharged to the receiving stream. Based on ENR concentrations, and the discharge permit loading limitations, the future facility's maximum daily effluent flow into the Upper Chester was determined. The maximum average daily flows from a standard ENR facility based on the current discharge permit limits are summarized in the table below.

Table 5 – Summary of Future Effluent Limits

	Total Nitrogen	Total Phosphorus
ENR Standards (mg/L)	3.0	0.3
Discharge Permit Max Annual Load (lb/d)	9.0	1.25
Highest Permitted ADF at ENR Standards (GPD)	366,000	500,000

Based on this analysis, the long-term wastewater capacity needs will exceed the allowable discharge to the Upper Chester River using the current limit of technology. To accommodate additional growth beyond the surface water discharge limits, the Town and County will need to utilize alternative discharge/beneficial use methods such as spray/drip irrigation or similar.

Section 4 - Alternatives Considered

For the purposes of this study, based on the history of flooding related damage and site restrictions, it is assumed that a new treatment facility will need be constructed at a different location. The new facility will be designed and constructed to meet MDE ENR standards. As previously noted, it is anticipated that the future WWTP will have a limited capacity of effluent able to discharge into the Chester River based on current nutrient management strategies. When capacity requirements exceed that value, alternative disposal or reuse options will be required to accommodate additional growth in the area. Based on current regulations, most disposal or reuse options will still require a high level of treatment equal to the surface water discharge. A distribution system at the treatment facility can allow for multiple off-site beneficial reuse and/or disposal alternatives to be accommodated in conjunction with the surface water discharge.

This study will focus on the maximizing the surface water discharge capacity via a 350,000 GPD facility. This capacity will allow for some cushion with effluent parameters as the future WWTP will not have to maintain perfect ENR effluent standards to comply with the expected permit. This study will also consider an ultimate treatment capacity of 600,000 GPD during site selection and layout to allow for expansion of the treatment systems in the future. The larger flow scenario will require the use of a different effluent discharge method than surface water. Multiple treatment process alternatives will be discussed below which are suitable for both surface water discharge and alternate disposal and reuse options. However, there are several project components which are common to all alternatives considered including new site selection, conveyance requirements, and treatment unit processes.

Site Selection:

As there is a history of flooding at the current facility location, it is assumed that the future facility will be constructed at a new location, outside of the flood zone. Most growth around the Town of Millington and surrounding County areas is anticipated between Route 301, Route 291, and Millington Road. It is recommended to locate the new facility in this area as well, as it is mostly open agriculture fields with proximity to the Chester River. Based on similarly sized facilities, with onsite stormwater management, a minimum of five acres of buildable area for the future facility is recommended. Five acres will provide room for capacity expansions, sludge dewatering, and stormwater management all in the same location.

There are a number of open spaces available for a new WWTP in the surrounding service areas with proximity to the Upper Chester River for discharging without major force main extensions and a new pump station. Most potential locations are within the growth area near Route 301 and part of potential development projects, which may aid in securing an acceptable site. For the purposes of this study, a *representative* site location was selected on one of the properties intended for development, but near the Chester River (See Figure 4). There are known wetlands near the potential site, which should be given consideration before finalizing the footprint and location of the new WWTP. This site is representative of most potential sites within the growth area as it will generally have the same conveyance system requirement and similar environmental considerations. Therefore, the specific site location is not a determining factor in the alternative selection process.

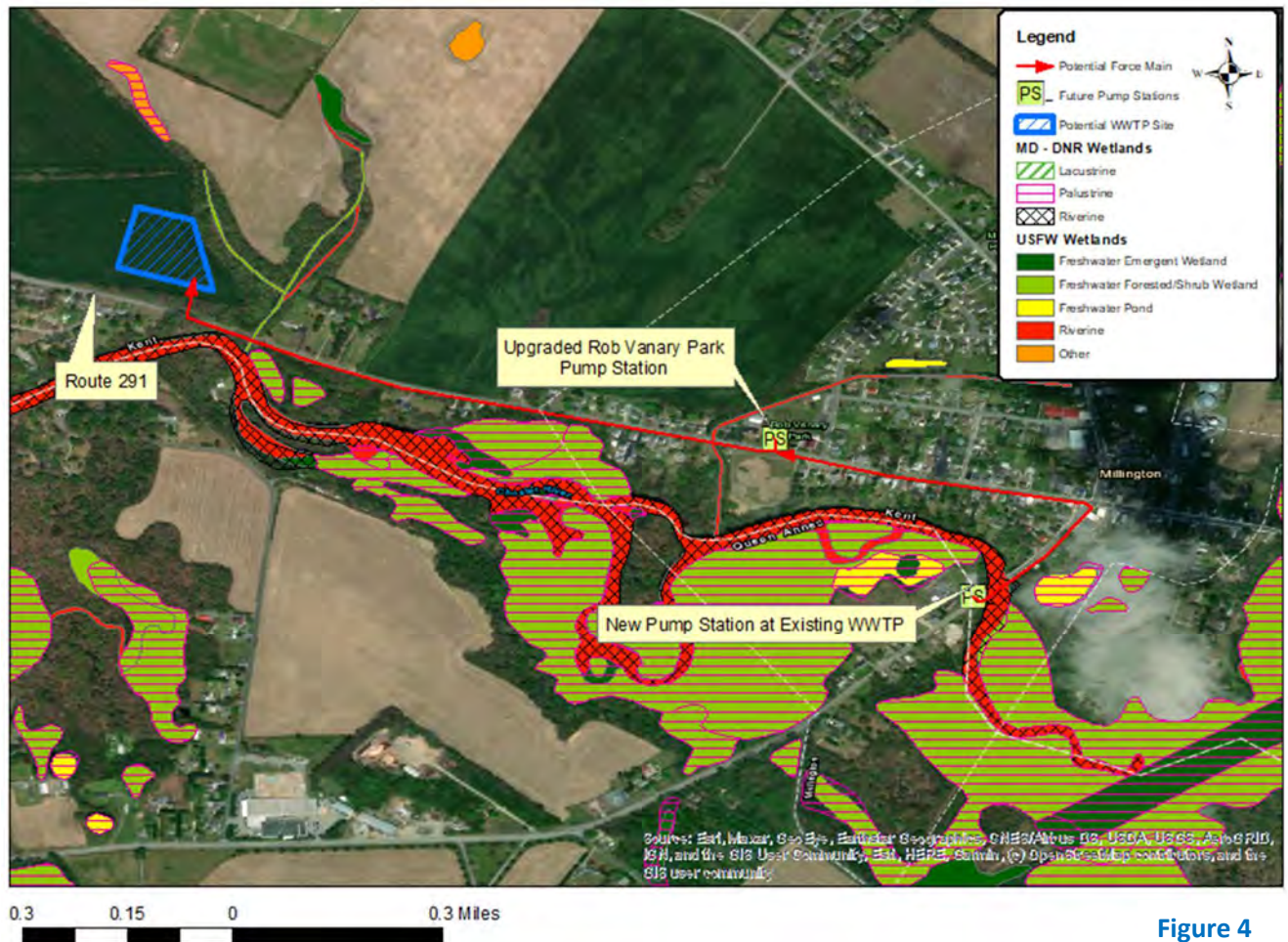


Figure 4

a. Conveyance

It is assumed that all new developments will be responsible constructing onsite utilities for conveying flow to the new WWTP or connecting to the existing Town system where appropriate. Some new properties may be able to connect to the Town's existing collection and conveyance system. In which case, the costs to upgrade existing conveyance infrastructure is also recommended to be the burden of the developer. Therefore, the scope of this study is limited to redirecting the existing user flows to the new WWTP location.

The existing conveyance system consists of two pump stations, gravity sewer, and low-pressure force mains via E-One grinder pumps. The main framework of the existing wastewater conveyance system to the existing WWTP is shown below. The force mains to the West of Town are all low-pressure mains from grinder pumps.

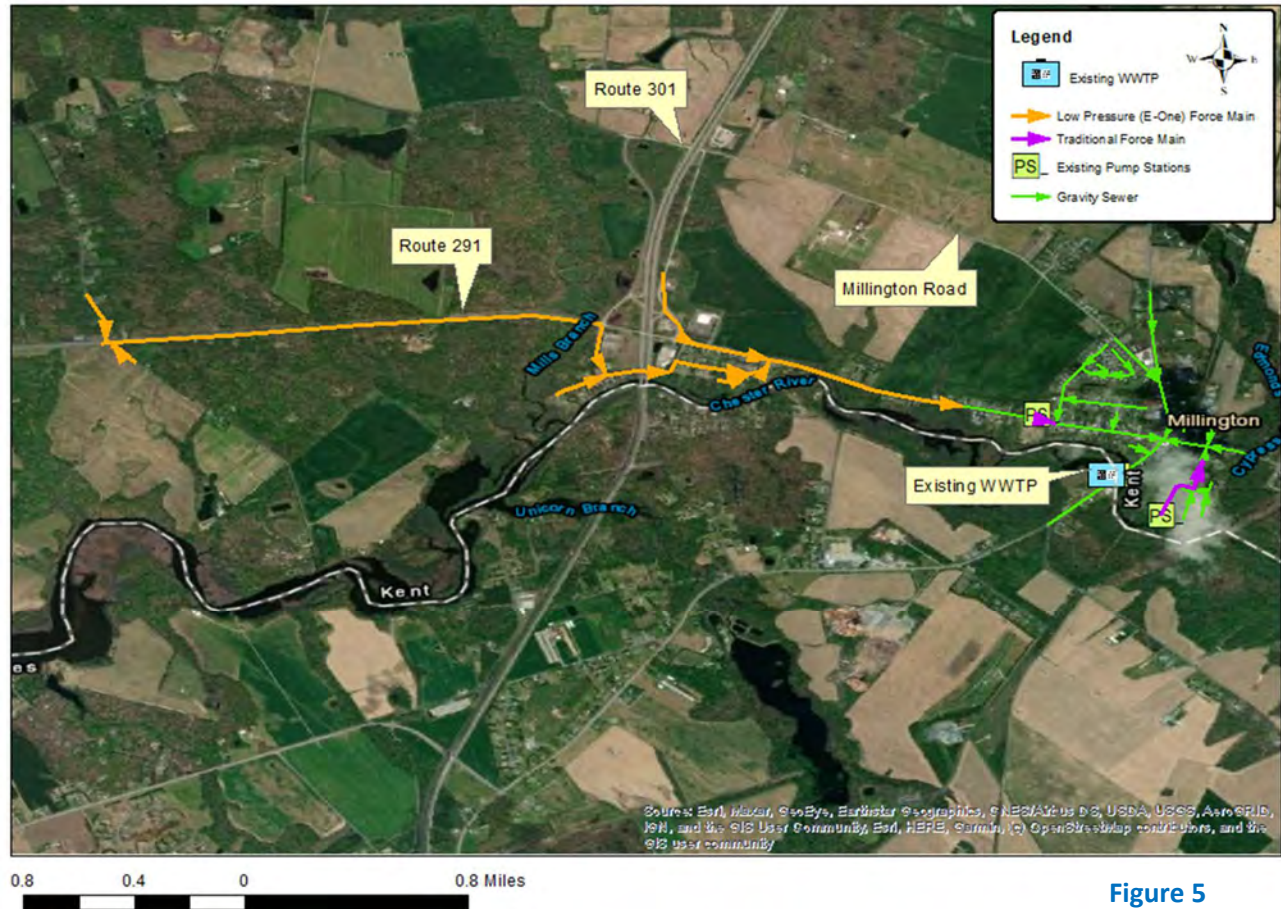


Figure 5

Based on the anticipated location, existing flows from the Town will need to be pumped via forcemain to the new treatment facility. To minimize costly modifications to the existing gravity collection system, a new pump station will be constructed at the existing WWTP along with a new force main. The pump station should be designed to protect critical components from damage during a flood event. The existing pump station at Rob Vanary Park is recommended to be upgraded and connect to the new force main which will pass directly in front of the station.

Currently, the low-pressure system which serves County properties west of the Millington discharges into gravity sewer on Route 291 and ultimately to the Rob Vanary Park PS. Initially, it is recommended that the low-pressure system remain in service as constructed. Flow will be conveyed through the Rob Vanary Park PS to the new treatment facility. This avoids a change to the hydraulic conditions of the low-pressure system and associated pumping stations. However, this conveyance should be revisited as new users are connected to the system as there could be ways to optimize the system in the future.

Figure 6, shown below, provides a concept map of the conveyance system improvements to a potential new WWTP facility. The Rob Vanary Park PS will continue to have the same influent flow as it is currently designed for but will discharge into a force main shared with a new pump station at the existing WWTP site. It is recommended that a hydraulic model be created to analyze this future scenario in more detail during design due to the complexity of a shared force main. The total force main length based on the potential WWTP shown below is 6,800 linear feet of 6" pipe from the new PS at the existing WWTP, and 100 linear feet of 4" pipe from Rob Vanary Park PS.

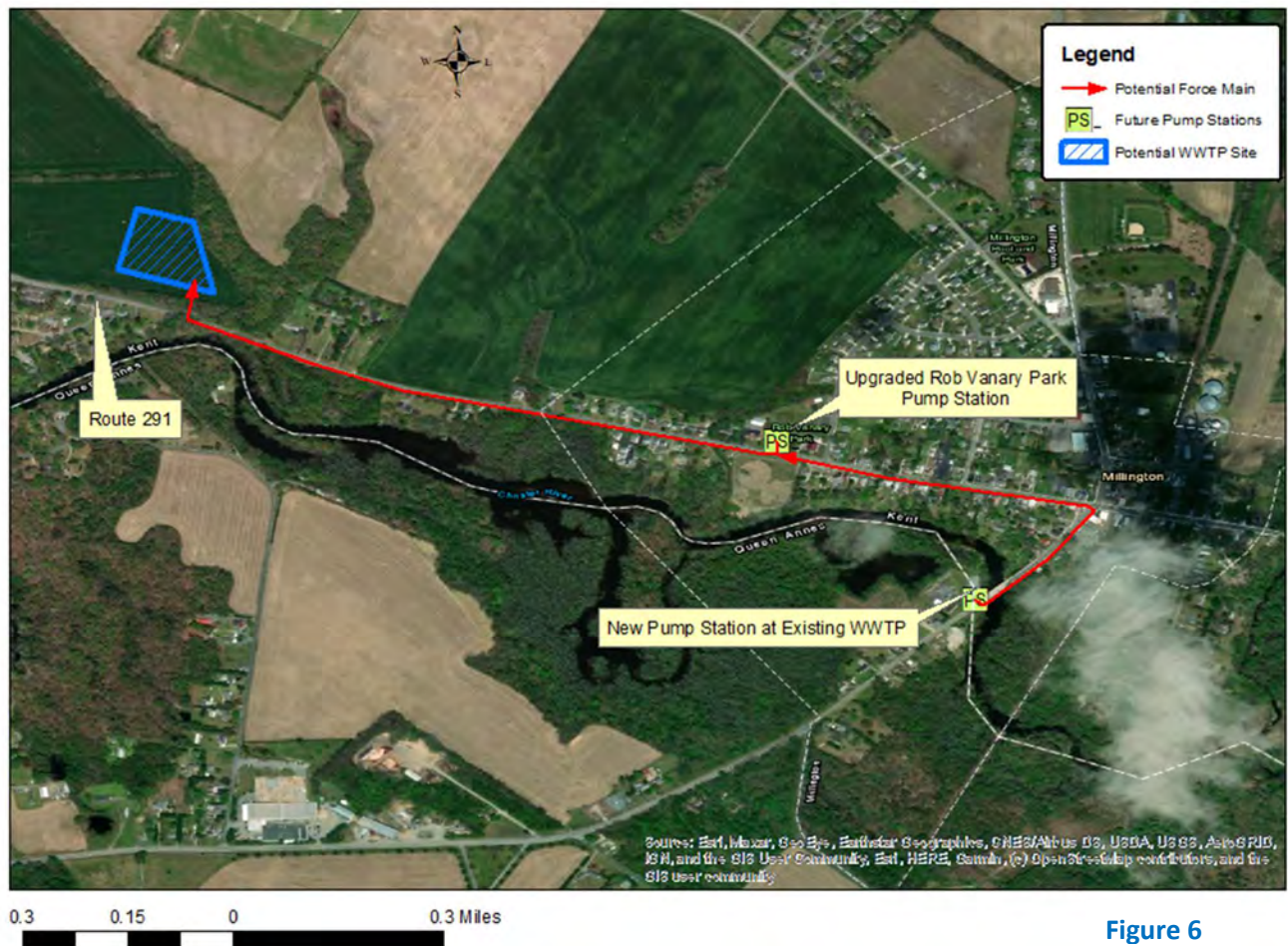


Figure 6

The upgrades at Rob Vanary PS should include replacing the existing submersible pumps based on the hydraulic modelling results. The pump station will have the same influent design flow, but it is recommended to perform an audit on this station to determine the true influent flows. The existing 4" piping at this PS should be inspected during future designs to determine if it can be reused, the hydraulic modelling results will also dictate if new larger piping is required. For the purposes of this study, it was assumed that new valves and piping are required. Other existing equipment at this site should be inspected in depth to determine what can and cannot be reused. While the pump station is being upgraded, bypass pumping will be required to handle the influent flows. Provided on the follow page is a cost estimate breakdown summarizing the anticipated construction costs for upgrading this pump station. It was assumed

that much of the existing equipment can be reused, including the generator, wet well and valve vault, fencing, and hoist.

Table 6 – Upgrades at Existing Rob Vanary Park PS Cost Estimate

Upgrades at Existing Rob Vanary Park PS	
Valves & Piping	\$ 30,000.00
Pumps and Controls	\$ 70,000.00
Site Work	\$ 40,000.00
Electrical	\$ 45,000.00
Mobilization & Demobilization	\$ 26,000.00
Temporary Facilities and Bypass	\$ 40,000.00
Bypass Manhole and Pumping Connections	\$ 20,000.00
100 LF of 4" PVC Force Main	\$ 7,500.00
Total Construction Cost:	\$ 278,500.00

The new pump station proposed at the existing WWTP will need to be sized to serve all County and Town EDUs not serviced by the Rob Vanary Park PS. It is believed the pump station could serve 392 EDUs based on future growth scenarios. Additional design considerations should be given to confirming the necessary pump capacities by hydraulic modeling of the system. A breakdown of costs estimated for the new PS are included below. Due to the proximity to the Chester River, the new PS should include flood proofing measures.

Table 7 – Existing WWTP New PS Cost Estimate

Existing WWTP New PS	
Generator & Pad	\$ 25,000.00
Wet Well	\$ 75,000.00
Valves & Piping	\$ 30,000.00
Pumps and Controls	\$ 70,000.00
Ventilation Fans	\$ 25,000.00
Site Work	\$ 40,000.00
Electrical	\$ 45,000.00
Mobilization & Demobilization	\$ 95,400.00
Temporary Facilities and Bypass	\$ 80,000.00
Bypass Manhole and Pumping Connections	\$ 20,000.00
6,800 LF of 6" PVC Force Main	\$ 544,000
Total Construction Cost:	\$ 1,049,400.00

Proposed Wastewater Treatment Plant:

For this study, three of the most common nutrient removal wastewater treatment technologies were evaluated: Sequencing Batch Reactor (SBR), Membrane Bio-Reactor, and Extended Aeration (Four-stage Bardenpho). These technologies have documented performance within the State of Maryland and are recognized by MDE as suitable, cost-effective methods to reach ENR discharge limits. As noted above, many of the supporting unit processes required for each technology will be the same and thus are not differentiators in the alternative selection process. The following processes are assumed to be common to all three alternatives evaluated:

- Headworks Building with Mechanical Screens* and Grit Removal
- Flow Equalization
- UV Disinfection
- Post Aeration
- Effluent Pump Station (possibly gravity outfall)
- Aerobic Digesters and Blowers
- Sludge Processing and Dewatering (w/ Building)
- Chemical Addition
- Process Control Building (with office and laboratory)

*MBR will required 2 mm screening

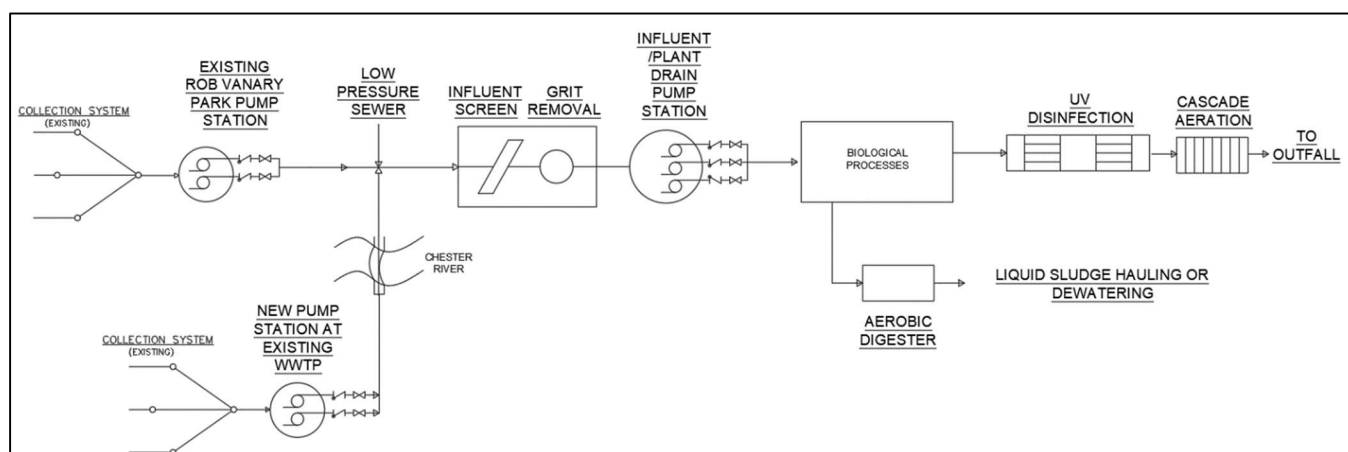


Figure 7

Figure 7 provides a process flow diagram displaying the common elements of all three alternatives. More detailed diagrams are provided for each alternative in the Appendix.

Preliminary Treatment (common to all alternatives):

Raw wastewater will be pumped to the new treatment facility and directly to the headworks. The headworks will consist of a mechanical screened to remove large debris and trash. For the SBR and Extended Aeration alternative, a 6mm mechanical screen will be provided. For the MBR alternative, 2mm screening will be required. In all alternatives, screenings will be collected, washed, and compacted prior to discharge to a dumpster for disposal at a landfill.

Following screening, grit is removed by a mechanical, vortex grit system (Smith and Loveless Pista-grit, or equal). The grit system is designed for 95% capture of grit larger than 105 microns. This system can maintain high levels of grit removal at low flow rates and peak flows minimizing future expansion or upgrade costs. This system may be constructed on site in concrete channels or can be purchased in a pre-assembled skid. Grit is subsequently washed in a grit classifier and discharged to a dumpster for disposal at the landfill.

Due to the anticipated proximity to nearby residential and commercial properties, as well as to provide protection from freezing, the preliminary treatment systems will be installed within a masonry building. The interior will be classified as a Class 1, Division 1 area due to the presence of raw wastewater. The building should also include heating, air conditioning, adequate venting, and utility water connections. A summary of the key features is provided below:

Table 8 – Headworks Design Summary

Headworks Design Summary	
Parameter	Value
Building Area	1,100 SF
Building Type	Masonry Block
Building Classification	Class 1 Division 1
Screen Type	6mm Perforated
No. of Screens	1 (w/ manual bypass)
Screen Washing	1 Washer / Press
Grit Removal	Vortex Classifier and Grit Pump
Grit Washing	Classifier and Dewatering Screw
Solids Conveyance	Screening Conveyor

Table 9 – Influent Pumping Station Design Summary

Influent Pumping Station Design Summary	
Parameter	Value
Pumping Station Type	Submersible
Pump Type	Non-Clog Centrifugal
Station Construction	Cast-in-Place
Number of Pumps	3 (2 Duty, 1 Spare)
Area Classification	Class 1 Division 1
Peak Design Conditions	927 GPM @ 32' TDH
Pump Motor Size	7 HP

Flow Equalization:

Regardless of the alternative selected, flow equalization will be required. For the SBR, flow equalization is typically implemented after the SBR (post-EQ) to equalize the high rate decant discharge and minimize impacts to downstream processes. For the MBR and extended aeration alternatives, flow equalization is typically implemented prior to the biological treatment system (pre-EQ), following preliminary treatment. In all alternatives, flow equalization provides additional operational flexibility and reliability. Flow equalization will be provided in a concrete tank, with mixers and submersible equalization pumps to convey flow to downstream processes. In the MBR and extended air alternatives, the equalization tank will serve as the influent pump station and no pump station is required downstream of the biological treatment. In the SBR alternative, a separate influent pump station will be required to convey the influent from the headworks to the SBR. The equalization tank downstream of the SBR will have a separate set up equalization pumps.

The equalization volume required for pre-equalization is dependent upon the diurnal flow pattern and can vary from system to system. For post-SBR equalization, the volume is dictated by the ability to store multiple decant volumes. For the purposes of this study, the volume is based upon MDE requirements for SBR decant storage. It is anticipated that the equalization tank will be constructed as part of the biological treatment structure and will have the following characteristics:

Table 10 – Post Equalization Design Summary

Post Equalization Design Summary	
Parameter	Value
Length	106'
Width	29'
Low Water Depth	1.5'
Max Water Depth	11.1'
Maximum Volume	252,946 Gal
Pumping Flow Rate	694 GPM

In the case of the SBR, where the EQ does not also function as an influent pump station, a dedicated station will be incorporated into the overall Headworks structure. The wetwell access is proposed to be on the exterior of the building, with all power and controls being located within a dedicated electrical room, which will not be classified. The influent pumps will be equipped with VFDs to provide flexibility in control for the operators.

Disinfection and Post Aeration (common to all alternatives):

Following the biological treatment systems, the clarified effluent will be conveyed to an ultraviolet (UV) disinfection system prior to surface water discharge. The proposed system will utilize a horizontal bulb configuration in open channels. Typical design includes multiple banks of lights - two duty banks at peak hourly flow, and just one duty bank required at average daily flow. The UV system must be designed to maintain the effluent fecal coliform limits of 200 fecal coliform per 100 mL as set in the MDE discharge permit. The following provides a summary of the proposed UV system:

Table 11 – UV Disinfection Design Summary

UV Disinfection Design Summary	
Parameter	Value
No. of Channels	1
Number of Banks	2
Number of Modules per Bank	6
Number of Lamps per Module	8
Total Number of Lamps	96
Design UV Transmittance	65%
E Coli Permit Limit	126 (MPN/100mL, monthly mean))
Minimum UV Dose	>30 mJ/cm ²

In conjunction with the disinfection, effluent will require a post-aeration system to raise DO to acceptable levels following treatment. If possible, the system will utilize gravity and a cascade aeration structure to aerate the effluent to acceptable levels before discharge to the surface water. The post aeration system can be located before or after the UV system, and potentially remotely, near the discharge location. Mechanical aeration using blowers and diffusers is also a possible alternative for consideration.

Effluent Pump Station (common to all alternatives):

Depending on the location of the new WWTP, a gravity outfall may be possible. However, for planning purposes, it is assumed that the discharge point will be located sufficiently distant from the treatment plant to require an effluent pump station. The effluent pump station will consist of a storage wetwell and pumping system capable of discharge to the Chester River. There is potential for effluent to flow via gravity to the Chester River depending on the final WWTP site. An effluent pumping station was assumed to be required for the purposes of this study. The wetwell will also provide a location for a water reuse pumping station. Initially, water reuse will be limited to onsite process needs such as the influent screen and grit systems, and general utility water needs (hose bibs, yard hydrants, etc). If offsite water reuse alternatives are developed, this structure will support additional pumping systems. The following provides a summary of the proposed effluent pumping station:

Table 12 – Effluent Pumping Station Design Summary

Effluent Pumping Station Design Summary	
Parameter	Value
Pump Type	Vertical Turbine
Station Construction	Cast-in-Place
Number of Pumps	3 (2 Duty, 1 Spare)
Peak Design Conditions	700 GPM

Chemical Addition (common to all alternatives):

All secondary treatment options will likely require some chemical addition. Typical chemicals added include metal salts for phosphorus removal, supplemental carbon to aid in nitrogen removal, and caustic

for alkalinity adjustment. For each system, bulk chemical storage, metered pumping systems, controls, and safety features will be required. A stand-alone chemical room (or building) is recommended at the new WWTP that includes heating, air conditioning, and adequate venting.

[Aerobic Sludge Holding and Thickening \(common to all alternatives\):](#)

Sludge produced by the biological treatment systems will require onsite storage and thickening systems regardless of the final disposal method. For many small facilities, the cost of operating a dedicated dewatering system is prohibitive and liquid sludge is hauled from the site by truck to a larger, regional facility. However, any reduction in volume through partial digestion and thickening will reduce the overall cost of transportation. For all three alternatives, a minimum of 30 days of sludge storage will be provided. A concrete tank structure with blowers and coarse bubble diffusers will provide storage and additional treatment of the waste sludge. A decant pump assembly will allow operators to settle sludge to the bottom of the tank and removal clear water from the upper levels of the tank to be recycled back to the plant influent. The following provides a brief summary of the proposed storage and aeration system:

Table 13 – Aerobic Digester Design Summary

Aerobic Digester Design Summary	
Parameter	Value
Digestion Type	Aerobic
Target Volatile Solids Destruction	35%
Solids Retention Time	30 Days
Air Flow Provided	30 SCFM / 1,000 cu-ft
Nozzle Type	Coarse
Influent Solids Concentration	1%
No. of Tanks	1
Max Water Depth	21'
Maximum Volume	214,885 gal
No. of Blowers	2

[Sludge Dewatering \(common to all alternatives\):](#)

For the purposes of this study, it is assumed that all sludge will be dewatered and hauled from the facility for disposal at a landfill or some other permitting application. Thickened sludge will be pumped from the aerobic holding tanks, conditioned with polymer, and dewatered using machinery such as a belt filter press or decanter centrifuge. For the purposes of this study, a packaged, skid-mounted belt filter press system is proposed which will include the sludge feed pumps, polymer addition, press, and controls. The system will be enclosed in a pre-engineered metal building which will also provide an area for a dumpster to minimize odor concerns to the surrounding properties. Table 13 on the following page provides a summary of the dewater system and building:

Table 14 – Dewatering Building Design Summary

Dewatering Building Design Summary	
Parameter	Value
Dewatering System	Belt Filter Press
Dewatering / Equipment Building	4,000 SF
Solids Loading Rate (Aerobically Digested)	600-900 lb/hour
Cake Dryness	17 – 22 %
Polymer Consumption	12 - 18 lb / DT

Control Building (common to all alternatives):

A pre-engineered control building is proposed to provide functional areas for the operators and maintenance personnel. The building will include a control room/office, electrical room, laboratory, men's and women's locker rooms, and a multipurpose utility area for equipment storage and maintenance. The following provides a brief summary of the control building:

Table 15 – Control Building Design Summary

Control Building Design Summary	
Parameter	Value
Building Area	2,500 SF
Building Type	Pre-Engineered Metal
Building Classification	Type II-B Non-Combustible, Unprotected

As noted above, many of the proposed treatment plant components will be common to all alternatives. The major differences between the alternatives are within the biological treatment processes following the headworks and prior to disinfection. For the purposes of this study a 4-Stage Bardenpho, Membrane BioReactor (MBR), and Sequencing Batch Reactor (SBR) are the considered alternatives.

Alternative #1: Extended Aeration - 4-Stage Bardenpho:

This alternative consists of a suspended growth continuous-flow biological nutrient removal process followed by clarification and tertiary treatment using denitrification filters. Equalized flow will be pumped to the Bardenpho system and pass through 4 treatment stages prior to clarification. The first stage is an anoxic basin, where bacteria break down organic nitrates and nitrites into nitrogen gas in a low oxygen environment. The next stage is an aerobic zone where the wastewater is aerated to increase oxygen concentrations to allow nitrification to occur. An internal mixed liquor recycle pump returns flow back to the first anoxic zone for denitrification. The recycling allows nitrate and nitrite formed in the aerobic basins to be begin denitrification and increase residence time. The non-recycled wastewater then enters a 2nd anoxic zone for continued denitrification polishing. The final step is a re-aeration zone that increases dissolved oxygen and stripping out nitrogen gas entrained in the mixed liquor.

Following the biological treatment cycle, traditional secondary clarifiers are used to allow suspended solids to settle and be removed from the effluent. A portion of the settled material is pumped to the initial anoxic zone as RAS to maintain proper mixed liquor suspended solid concentrations. The other portion of settled sludge is fully removed from the treatment process as waste sludge.

This four-stage system in conjunction with clarifiers can meet ENR discharge limits without further treatment. However, a continuous backwash denitrification filter system is recommended to provide additional polishing and redundancy to ensure compliance during unusual operating conditions. In addition to nitrogen removal, this filter provides tertiary treatment to reduce total suspended solids and total phosphorus prior to discharge. Typical construction involves concrete structures with deep-bed sand filters mechanisms. These denitrification filters can be easily expanded for future flow scenario.

Table 16 – 4-Stage Bardenpho Design Summary

4-Stage Bardenpho Design Summary	
Parameter	Value
Number of Trains	2
Common Train Width	12'
Anaerobic Length	10'
Aerobic Length	71'
Post-Anoxic Length	12'
Re-aeration Length	4'
Side Water Depth	16'
Unit Volume	139,000 gal
Total Volume	278,000 gal
Food to Mass Ratio	0.078 Lbs BOD5 / Lbs MLSS-Day
Mixed Liquor Concentration	4,400 mg/L
Aerated Hydraulic Retention Time	13.9 Hours
Sludge Age	10.6 Days
Actual Oxygen Demand	408 lb / Day

Table 17 – 4-Stage Bardenpho Clarifier Design Summary

4-Stage Bardenpho Clarifier Design Summary	
Parameter	Value
No. of Clarifiers (Initial Phase 350,000 GPD)	2
No. of Clarifiers (Future Phase 600,000 GPD)	2
Diameter (Feet)	40
Clarifier Surface Area, Per Unit	1,257 SF
Clarifier Surface Area, Total (Initial Phase)	2,514 SF
Clarifier SOR at Initial Design Peak Hourly Flow (1 Clarifier Operational)	1,062 GPD / SF
Clarifier SOR at Initial Design Peak Hourly Flow (2 Clarifiers Operational)	531 GPD / SF

Table 18 – Tertiary Denitrification Filtration Design Summary

Tertiary Denitrification Filtration Design Summary	
Parameter	Initial Phase (350,000 GPD)
Total Number of Filters	3
Hydraulic Load	3.1 gpm / SF
Solids Load	0.92 lb / SF * day
Bed Depth	9.85 ft
Total Reject Flow	45 gpm
Compressor System (1 Duty, 1 Standby)	15 HP

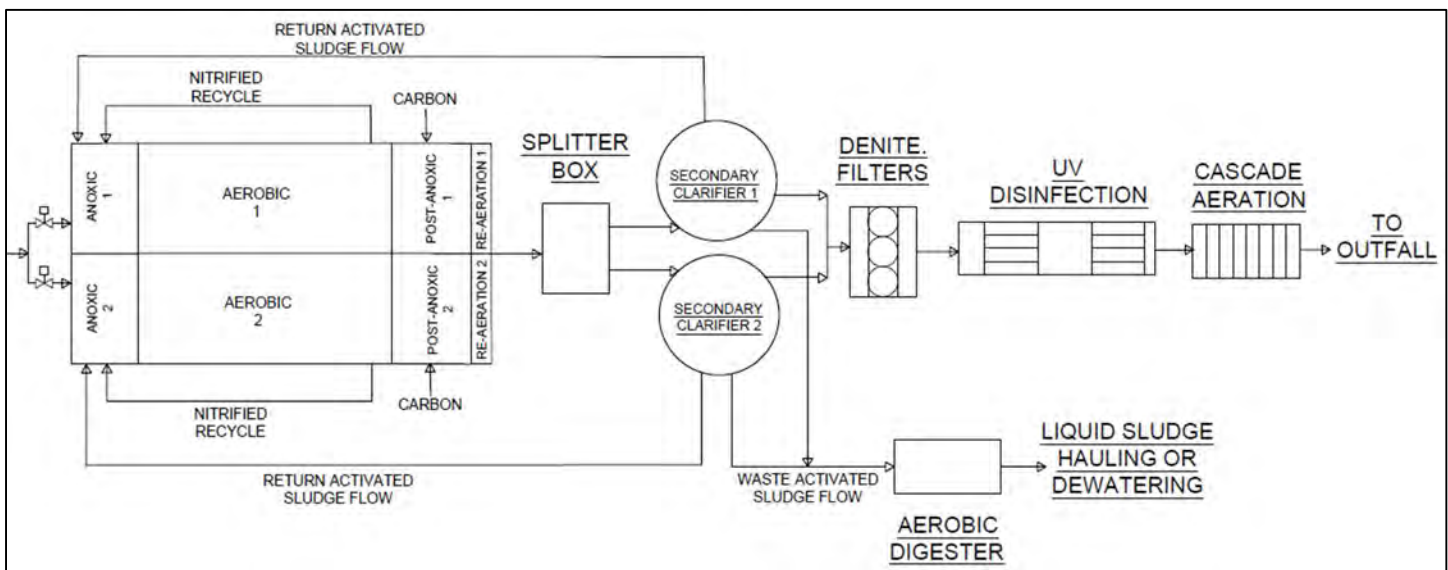


Figure 8

Alternative #2: Membrane Bioreactor (MBR):

The Membrane Bioreactor (MBR) alternative generally use the same biological treatment steps as the 4-Stage Bardenpho discussed above. However, following the re-aeration stage, membrane filters are used to separate clear effluent from the mixed liquor instead of traditional clarifiers. Traditional clarifiers rely on gravity and time to allow solids to settle and clear liquid to be removed from the surface. Membrane filters use pumps to create pressure differential on opposing sides of the membrane materials. The membranes have pore sizes which restrict solids passage, only allowing clear water to pass. The membrane filter modules are typically submerged within the biological reactor but can be within a separate side stream. The other major difference in the MBR is the allowable mixed liquor concentrations. Since the membranes don't depend on gravity for solids separation, the allowable mixed liquor concentration can be significantly higher than traditional activated sludge systems (2-3x higher). This higher concentration results in a much smaller treatment volume required and therefore

smaller treatment tanks. Due to the high level of filtration and finite barrier provided by the membranes, no tertiary filtration is required.

For the purposes of this study, a Kubota MBR system was evaluated as the basis of design. The proposals for both flow scenarios are included in the appendix. The proposals are based around the SP600 Submerged Membrane Unit. This system is composed of activated sludge and membrane filtration. These membrane units are installed in the activated sludge reactor, where sludge and treated water are physically separated eliminating the need for final clarifiers. This system is proposed to use a four-stage Bardenpho process flow for the system to achieve an effluent total nitrogen concentration of 3 mg/L. It will include biological treatment trains each with a pre-anoxic tank, aeration tank, post-anoxic tank, and MBR tanks in parallel. A common MBR feed channel will be used to distribute flow between the MBR tanks. A common return activated sludge channel will be used after the MBRs to recycle sludge to the pre-anoxic tank. An internal recycle line will also return flow from the first aeration basin to the pre-anoxic tank.

The initial flow scenario will require two pre-anoxic tanks, two aeration tanks, two post-anoxic tanks, three MBR tanks, and one RAS channel. Tank volumes will need to be approximately twice as large for the expanded flow scenario. Preliminary tank sizing, dimensions, and additional information is included within the appendix.

Table 19 – MBR Design Summary

MBR Design Summary	
Parameter	Value
Number of Membrane Tanks	3
Number of Biological Treatment Trains	2
Membrane Surface Area per Unit	6,456 SF
Mixed Liquor Concentration	12,000 mg/L
Total Submerged Membrane Units	9
Pre-Anoxic Tank Dimensions	4.5' L x 16.5' W x 16.6' SWD
Aeration Tank Dimensions	16' L x 16.5' W x 16.1' SWD
Post-Anoxic Tank Dimensions	5' L x 16.5' W x 15.6' SWD
MBR Tank Dimensions	13.5' L x 10.5' W x 15.1' SWD
RAS Channel Dimensions	37' L x 5' W (SWD Varies)
Total Hydraulic Residence Time at Max Monthly Flow	5.9 Hours
External Carbon Dosing to Post-Anoxic Tank	1.4 Gallons per Day of MicroC 2000
Pre-Anoxic Mixer	Submersible, 0.7 HP
Pre-Aeration Diffuser	Fine Bubble
Pre-Aeration Blower	Positive Displacement, 15 HP
Post-Anoxic Mixer	Submersible, 0.7 HP
RAS Pump	414 GPM, 5 HP
WAS Pump	30 GPM, 0.5 HP

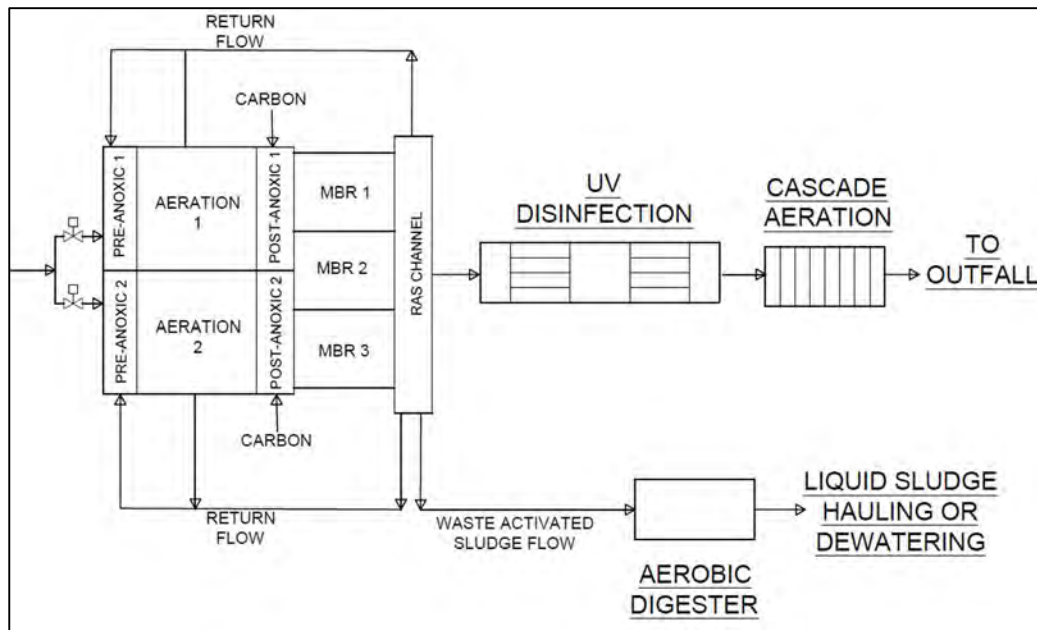


Figure 9

Alternative #3: Sequential Batch Reactor (SBR):

Sequential Batch Reactors are another form of activated sludge treatment, but instead of a continuous flow process with multiple treatment zones, tanks, and clarifiers, SBRs perform all treatment and clarification in a single tank, in batches. Instead of discrete treatment zones, SBRs use a timed sequence of operation to create the alternating anoxic and aerobic treatment followed by settling of the sludge and decant of clarified effluent. SBRs do not require secondary clarifiers because solid removal is achieved in the same basin at the biological reactions. Sludge remains within the same tank so no RAS or internal recycle streams are required. Waste sludge is removed following settling and prior to the start of a new batch.

Since the treatment happens in batches, SBR systems inherently will require a minimum of two reactor basins at a minimum. Flow equalization will occur after the SBRs (post-EQ) to accept the high rate decant discharge and convey it to downstream processes in a more controlled flow pattern. As with the traditional Bardenpho process, SBRs can be designed with enough volume (time) to reach total nitrogen levels of 3.0 mg/l. However, denitrification filters following the SBR are recommended to ensure the facility can consistently achieve ENR concentrations of nitrogen and phosphorus and provide additional solids polishing. The previously discussed Continuous Backwash Denitrification Filter System is recommended for use.

The following table provides a brief summary of the design basis for the SBR system:

Table 20 – SBR Design Summary

SBR Design Summary	
Parameter	Value
Number of SBR Tanks	2
Length	57'
Width	40'
Low Water Depth	13.7'
Average Water Depth	18.6'
Max Water Depth	21.0'
Max Unit Volume	358,000 Gallons
Total Volume	716,000 Gallons
No. of Cycles per Day	4
Cycle Duration	6 Hours
Food to Mass Ratio	0.096 Lbs BOD5 / Lbs MLSS-Day
Mixed Liquor Concentration	4,500 mg/L at LWL
Hydraulic Retention Time ¹	0.946 Days @ AWL
Solids Retention Time ¹	14.1 Days
Estimated Sludge Yield ¹	0.709 Lbs WAS / Lbs BOD5
Decant Flow Rate ¹	2,083 GPM
Lbs Oxygen / Lbs BOD	1.25
Lbs Oxygen / Lbs TKN	4.6
Actual Oxygen Required ¹	3,124 Lbs / day
Air Flow per Basin ¹	931 SCFM
Max Pressure	10.7 PSIG
Note 1 - Values are Provided for Phase 1 of 350,000 GPD	

Table 21 – Tertiary Denitrification Filtration Design Summary

Tertiary Denitrification Filtration Design Summary		
Parameter	Units	Initial Phase (350,000 GPD)
Total Number of Filters		3
Hydraulic Load	gpm / SF	3.1
Solids Load	lb / SF * day	0.92
Bed Depth	ft	9.85
Total Reject Flow	gpm	45
Compressor System (1 Duty, 1 Standby)	HP	15

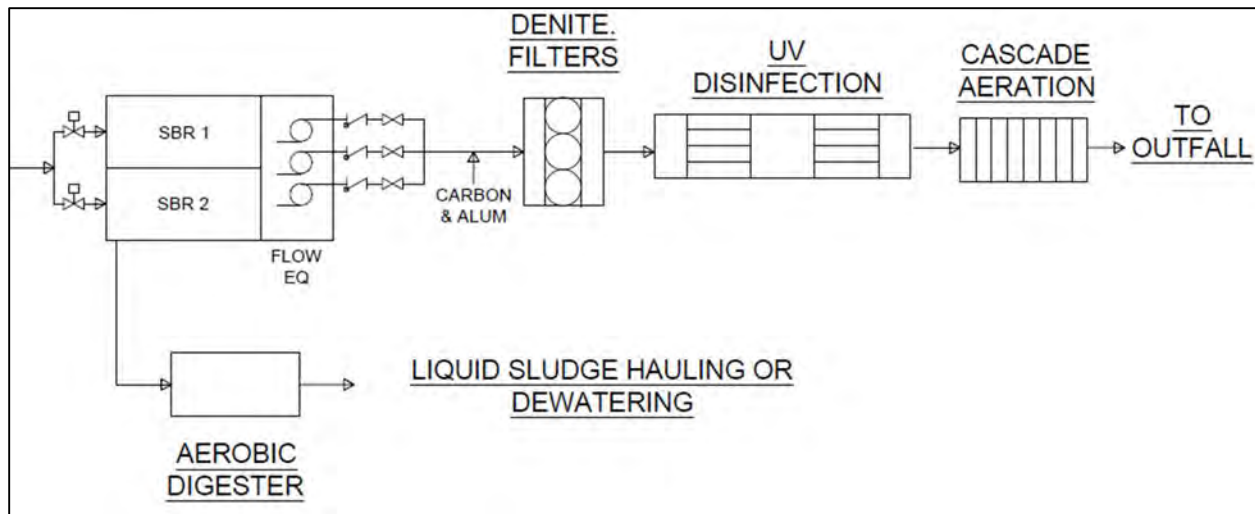


Figure 10

Future Expansion:

To accommodate future growth in the region, the proposed treatment facility shall be designed and constructed to facilitate expansion. The basis of design for this report assumes an initial treatment capacity of 350,000 GPD. Based on current projections, an ultimate capacity of approximately 600,000 GPD is probable. The overall site layout must accommodate future structures and equipment, as well as increase delivery and truck traffic. Most unit processes can easily be expanded modularly, but some, like the headworks, may benefit from up front capital expenditures to make future expansion feasible.

Another consideration is the cost of initial construction versus future expansion as it relates to funding and immediate capacity needs. As noted above, the existing facility continues to be at risk for flood damage and is nearing its design capacity. If the new facility is designed and constructed for significant growth, but the growth is slower than predicted, it leaves the financial burden on the existing users. In addition, some funding sources such as the ENR program are limited to existing capacity only. Any capacity expansion will decrease the percentage of the total costs which are eligible for funding. Therefore, the Town and County should seek to only build in sufficient capacity for existing needs, moderate growth, and/or capacity reserved by the development community with financial contributions.

Prior to final design activities, the Town and County should coordinate with potential developers, funding agencies and MDE to select a proposed design capacity for the initial phase of construction. Based on this capacity, a phased expansion plan should be developed to accommodate future construction without disruption to the existing plan. (Note: A minimum capacity of 200,000 gpd is anticipated. Based on this capacity, the alternative analysis presented here remains valid.)

Section 5 - Selection of an Alternative

a. Construction Cost Analysis

Each alternative will include the same conveyance system improvement costs. This work includes new force mains, pump station upgrades, a new pump station, and demolition of the existing WWTP. Demolition of the existing WWTP consists of the removal of all equipment, buildings, and structures at the site. There will only be a pump station located at the existing WWTP site after demolition is completed. The costs associated with construction of each treatment alternative, and the conveyance system, are included below. The SBR alternative has the lowest estimated construction cost but is relatively close to the MBR alternative. The SBR process includes all secondary biological treatment occur within the same tank, reducing overall costs. The initial equipment costs and concrete tank costs are high for the MBR alternative, but not having tertiary filter equipment is a large cost savings. The MBR alternative is a close second in cost, estimated to be nearly \$30,000 more expensive for initial construction costs. The traditional 4-Stage Bardenpho has the highest up front equipment cost. This is expected as it has multiple concrete tanks required, secondary clarifiers, and tertiary equipment required. Due to the higher cost of the 4-Stage Bardenpho, it is considered the least viable option. Based on the small cost difference between the SBR and MBR alternatives, the construction costs are not a deciding factor between the two alternatives. A breakdown of each cost for the alternatives is provided on page 30. A more detailed cost estimate including all project costs of each treatment alternative is also provided in the appendix.

Table 22– Alternatives Construction Cost Estimate Comparison

Item No.	Description	Costs		
<i>New WWTP Standard Equipment</i>		SBR	MBR	BardenPho
1	Headworks Building	\$ 209,000	\$ 209,000	\$ 209,000
2	Fine Screen	\$ 69,000	\$ 69,000	\$ 69,000
3	Grit Removal System	\$ 370,000	\$ 370,000	\$ 370,000
4	Influent Pumps, wetwell, control	\$ 250,000	\$ 250,000	\$ 250,000
4	Belt Filter Press	\$ 495,500	\$ 495,500	\$ 495,500
5	Chemical Addition	\$ 200,000	\$ 200,000	\$ 200,000
6	Concrete for Cascade Equipment	\$ 9,000	\$ 9,000	\$ 9,000
7	Concrete for Denite Equipment	\$ 108,000	\$ -	\$ 108,000
8	Concrete for Mechanical Screen	\$ 35,683	\$ 35,683	\$ 35,683
9	Concrete for Secondary Clarifiers	\$ -	\$ -	\$ 467,469
10	Concrete for UV Channel	\$ 36,000	\$ 36,000	\$ 36,000
11	Concrete Tanks (SBR, PEQ, Aerobic Holding)	\$ 1,170,000	\$ -	\$ -
12	Concrete Tanks (EQ & Aerobic Holding)	\$ -	\$ 576,000	\$ 576,000
13	Concrete Tanks for MBR Processes	\$ -	\$ 360,000	\$ -
14	Concrete Tanks for 4-Stage Bardenpho Processes	\$ -	\$ -	\$ 757,600
15	Denite Equipment	\$ 837,520	\$ -	\$ 837,520
16	Aerobic Holding Tank Equipment	\$ 414,835	\$ 414,835	\$ 414,835
17	Flow Equalization Equipment	\$ 320,385	\$ 320,385	\$ 320,385
18	Aqua SBR	\$ 764,230	\$ -	\$ -
19	Kubota MBR	\$ -	\$ 1,975,000	\$ -
20	4-Stage Bardenpho Process & Clarifier Equipment	\$ -	\$ -	\$ 1,723,000
21	Process and Control Building	\$ 950,000	\$ 950,000	\$ 950,000
22	Effluent Pump Station & Force Main	\$ 325,000	\$ 325,000	\$ 325,000
23	Equipment Buildings	\$ 340,000	\$ 340,000	\$ 340,000
24	Site Piping	\$ 500,000	\$ 500,000	\$ 500,000
25	UV Disinfection	\$ 235,000	\$ 235,000	\$ 235,000
	Subtotal	\$7,639,153	\$7,670,403	\$9,228,992
<i>Conveyance System Improvements</i>				
27	Demolition and Renovation at Existing WWTP	\$ 300,000	\$ 300,000	\$ 300,000
28	Pumps, Controls, Renovations of Rob Vanary Park PS	\$ 271,000	\$ 271,000	\$ 271,000
29	New Pump Station at Existing WWTP Site	\$ 505,400	\$ 505,400	\$ 505,400
30	New Force Main (6" PVC)	\$ 544,000	\$ 544,000	\$ 544,000
31	New Force Main (4" PVC)	\$ 7,500	\$ 7,500	\$ 7,500
	Subtotal	\$1,627,900	\$1,627,900	\$1,627,900
<i>General</i>				
32	Construction Stake Out (0.5%)	\$46,335	\$46,492	\$54,284
33	E&S, SW management (1%)	\$92,671	\$92,983	\$108,569
34	Paving and Restoration (2%)	\$185,341	\$185,966	\$217,138
35	Electrical/HVAC/Mechanical (15%)	\$1,390,058	\$1,394,746	\$1,628,534
36	Bonds and Insurance (1%)	\$92,671	\$92,983	\$108,569
37	Mob and Demob (4%)	\$370,682	\$371,932	\$434,276
38	Contingency (25%)	\$2,316,763	\$2,324,576	\$2,714,223
	Total Construction	\$13,761,574	\$13,807,980	\$16,122,485

b. Life Cycle Cost Analysis

A life cycle present worth cost analysis was performed on each of the three proposed alternatives for the Millington WWTP Phase 1, average daily flow of 350,000 gallons. The three alternatives were compared based on their net present value of a 20-year planning period including initial capital costs, disposal, chemicals, short lived asset maintenance and replacement, and energy costs. The table below summarizes assumptions and rates used for the life cycle cost analysis:

Table 23 – Life Cycle Analysis Variables

Description	Rate	Source
Inflation	3.4%	Federal Open Market Committee
Electricity (kWh)	\$0.13/kWh	Per Historical Rates in the Region
Planning Analysis Period	20	Years

Inflation rates are based on recent updated inflation estimates from the Federal Open Market Committee for 2023. Electrical costs per kilowatt hour (kWh) are based on available information from U.S. Energy Information Administration for the State of Maryland. These rates are likely to change over the course of the 20-year planning period but will provide an accurate estimate of costs. It was assumed that at the end of the 20-year planning period, there would be no significant salvage value of equipment or materials.

The initial capital expenditure costs assumed a contingency factor of 25% to determine proposed construction costs to cover portions of the project not covered through individual line items of the estimate. Percentages of construction costs were also used for construction stake out (0.5%), erosion and sediment management (1%), paving and restoration (2%), electrical and HVAC and mechanical (15%), bonds and insurance (1%), and mobilization and demobilization (4%). The legal, administration, engineering, and design costs were estimated as a percentage of the proposed construction costs (10%). The costs for bidding, construction management services, and inspection were also estimated as a percentage of the proposed construction costs (5%). It is anticipated that construction will be fully completed for the WWTP and conveyance system within two years, so the total capital expenditure costs are split evenly over this time.

The operational expenditure costs were determined using a modified uniform series present worth calculation to account for rising operation and maintenance costs over the 20-year analysis period. The main components of the operational expenditures include short lived asset maintenance and replacement, energy costs, chemical costs, and reserve allocations to cover costs of major equipment rehabilitation and replacement.

The table below shows the estimated annual operation and maintenance costs for the three alternatives.

Table 24 – Annual O&M Cost Estimates

<u>Description</u>	<u>SBR</u>	<u>MBR</u>	<u>Bardenpho</u>
Electrical Costs	\$ 116,885	\$ 120,391	\$ 107,565
Personnel Costs	\$ 100,000	\$ 100,000	\$ 100,000
Chemical Costs	\$ 28,452	\$ 28,452	\$ 28,452
Miscellaneous Costs	\$ 9,750	\$ 20,500	\$ 10,500
Reserves Allocated for Future Maintenance	\$ 51,600	\$ 121,900	\$ 78,100

It was assumed that the concrete tanks would have negligible salvage value at the end of the 20-year period. All other equipment for the conveyance system and WWTP is classified as a short-lived asset, such as the pumps, motors, and back-up generators. Short lived asset costs are included as annual operation and maintenance costs based on the typical service life and annual maintenance costs. The annual operation and maintenance costs include a line item of recommended annual reserves dedicated for future equipment replacements. More detailed breakdowns of the short-lived assets are included in Appendix G.

The estimated net present value of each treatment alternative is provided in the table below. This value represents the capital construction costs and annual operation and maintenance costs for the alternatives over a 20-year period. The net present value was calculated based on the following equation per USDA Bulletin 1780 2:

$$NPV = C + USPW (O\&M) - SPPW (S).$$

- C = Initial Capital Costs
- USPW (O&M) = present worth of the uniform series of annual operation and maintenance
- SPPW (S) = single payment present worth of the salvage value (assumed zero salvage value)

Table 25 – Net Present Value of Treatment Alternatives

<u>Description</u>	<u>SBR</u>	<u>MBR</u>	<u>Bardenpho</u>
Capital Costs	\$ 15,825,810	\$ 15,879,178	\$ 18,540,858
Annual O&M	\$ 306,687	\$ 391,243	\$ 324,617
USPW (O&M)	\$ 4,398,466	\$ 5,611,151	\$ 4,655,615
Net Present Value	\$ 20,224,276	\$ 21,490,329	\$ 23,196,473

Based on the net present value of the three alternatives, as shown in the above table, the SBR alternative has the lowest value estimated to be approximately \$20.22M. This makes the SBR alternative the most attractive option fiscally over the planning period.

c. Non-monetary Factors

Alternatives were evaluated based on non-monetary factors as well. Considerations were given to performance, operations and maintenance, expandability, and environmental sustainability. All three alternatives are recommended to utilize energy saving strategies in lighting designs, HVAC designs, automating processes, and by using variable frequency drives. All alternatives also utilize many of the same unit processes which will have the same sustainability impacts and recommendations. As all three alternatives have very similar sustainability impacts, it is not considered a significant deciding factor in the selection of an alternative. The operations and maintenance of any selected alternative is assumed to be operated by Kent County based on previous discussions with the Town and County. Though SOS may continue to be contracted for operations.

The SBR system is almost completely automated, allowing for simpler day to day operations during normal conditions. However, as each basin acts independently and all biological process occur within a single tank, there is some operational complexity when fine tuning processes. An operator may need to adjust cycle times, but advanced SCADA controls and remote monitoring used in new WWTPs allows for simpler interactions and straightforward calibrations. The SBR system selected as part of this analysis, from Aqua Aerobics, is onsite to begin startup and calibration and offers remote monitoring to minimize operator learning curves. The SBR system requires tertiary filters to reach ENR nitrogen limits which adds more equipment to maintain and operate.

The MBR utilizes a 4-Stage Bardenpho treatment process but does not require clarifiers or tertiary denitrification filters like a traditional Bardenpho. While there is some added complexity and equipment when using membranes, overall, there is less equipment than a comparable Bardenpho alternative. The MBR operates at a much higher MLSS than the other alternatives, allowing for a reduced treatment plant footprint. The MBR also doesn't require secondary clarifiers or denitrification equipment like the traditional 4-Stage Bardenpho alternative, simplifying the treatment process further. Both the MBR and Bardenpho alternatives utilize a continuous flow through treatment and require independent monitoring of each designated reactor space to ensure proper treatment. The MBR system selected as part of this analysis, from Kubota, is a packaged system simplifying coordination through a single system provider for all stages.

The SBR alternative can be easily expanded as all biological processes occur within independent contained basins, so expansion from the initial 350,000 GPD phase to 600,000 GPD phase would only require adding another basin/tank. The tertiary denitrification filtration would also only require adding one more filter tank to meet ultimate buildout flows. Both the MBR and 4-Stage Bardenpho alternatives require the construction of another complete process train, with several independent tanks. The traditional Bardenpho would also require the tertiary filtration expansion and secondary clarifier expansion.

The overall operation and maintenance for the alternatives varies, each with their own advantages and disadvantages. However, the SBR is a more automated system that allows for simplified calibration and monitoring once up and running. The MBR system has the least amount of equipment but requires a considerable amount of operator input and time spent monitoring each unit process tank. The 4-Stage Bardenpho has the most equipment and is the

most hands-on operationally. Based on the relatively small size of the future WWTP at ultimate buildout, the SBR alternative is the simplest alternative to expand and would also keep overall operations and maintenance generally unimpacted. As ease of operations and expandability is important for the future facility, the SBR alternative would be the best alternative. Based on both the monetary and non-monetary considerations, it is recommended that an SBR alternative be pursued with the planning and design of a new WWTP. Detailed design elements of the proposed WWTP are included in the following section.

Section 6 - Proposed Project

a. Wastewater Treatment Selection

The proposed SBR alternative WWTP will have the unit process as described in Section 4. The WWTP will be sized to accommodate the 350,000 GPD initial flow, with an expansion planned to 600,000 GPD in the future as demand increases. The buildings and structures to be included for the SBR WWTP design are included below. Refer to Section 5 for a detailed design summary of each component listed below.

- (1) Headworks Building – Influent flow will be pre-treated in a headworks building. It is recommended to utilize a masonry block building containing a fine mechanical screen, grit removal system, and an influent pump station. One screening channel is required, with a backup mechanical screening channel in reserve. The influent pumping will need to convey all flow to the SBR basins. VFDs are recommended to be utilized to minimize energy usage and to be able to handle the large range of influent flows expected at the new WWTP as buildout occurs.
- (2) SBR Treatment – the biological processes will occur within two identical basins utilizing a middle-shared wall. The SBR design parameters are based on an Aqua Aerobics proposal included within the appendix. Additional equipment required includes two 10 HP mixers, decanters, two 2.7 HP transfer pumps, six fine bubble diffusers, three 40 HP positive displacement blowers, and chemical carbon addition.
- (3) Aerobic Holding Tank – The waste sludge from the SBR biological processes will be sent to a single holding tank. In this tank bubble diffusers and mixers provide space for the sludge to be further broken down before dewatering and sludge hauling. For the purposes of this design, dewatering equipment was assumed to be onsite. The aerobic tank will be an open concrete tank with a 2.7 HP submersible pump and a 75 HP fixed coarse bubble diffuser.
- (4) Dewatering System – following the additional aerobic sludge breakdown and stabilization in the holding tank, biosolids will be conveyed to the dewatering system. It is assumed that a belt press system will be utilized for dewatering. The belt press will concentrate solids, lowering the burden of hauling waste. This is an optional process and will not impact the WWTPs performance or quality of effluent.
- (5) Post Equalization – The treated water will be decanted from the SBR into a post equalization tank. This tank allows for all downstream processes to be calibrated to a single average flow. Additional equipment required includes three 3 HP submersible pumps, a fixed coarse bubble diffuser system, and one 10 HP positive displacement blower package.
- (6) Tertiary Denitrification Filters – To reach ENR total nitrogen and TSS effluent limits, continuous sand backwash filters will be utilized. It is recommended that three filter units be utilized in the initial flow scenario, with a empty fourth spare tank for future expansion. Additional equipment required includes two 15 HP compressor systems, filter media, influent and effluent pumps.

- (7) Disinfection – it is assumed that all effluent flow will be discharged into the Chester River during the initial buildout phase. Therefore, UV disinfection is required. It is recommended to have the UV channel initially constructed for easy expansion to the future flow scenario. During the initial flow scenario when the system is oversized, the UV system can be calibrated and turned down to conserve energy. The system utilizes self-contained modules with UV lamps. The modules are placed within a concrete channel and have a monitoring system.
- (8) Effluent Pumping Station – based on the assumed location of the potential WWTP, as described in Section 4, an effluent pump station and forcemain will be required to discharge into the Chester River. In the future expansion scenario, a second forcemain will be required to transport effluent to another location based on the TMDLs for the Chester River. The initial pump station is recommended to be sized independent of the future scenario. It is recommended to utilize standard submersible pumps like the influent pump station. As there is uncertainty with the future WWTP location, the pump station design point and forcemain length should be revisited once a WWTP location is selected.

b. Conceptual Design

(1) Project Cost Summary

A detailed cost estimate is provided below based on the proposed project. The total costs associated with the proposed project is estimated to be \$15,825,810. This estimate is inclusive of all conveyance system improvements, construction of the new WWTP, demolition of the existing WWTP, all general construction items, legal fees, engineering and design, and construction management and inspection.

Table 26 – Proposed Project Cost Estimate

Item No.	Description	Quantity	Unit	Unit Cost, \$		Total
				Material	Labor	
New WWTP Standard Equipment						
1	Headworks Building	1100	SF	\$ 120	\$ 70	\$ 209,000
2	Fine Screen	1	EA	\$ 53,000	\$ 16,000	\$ 69,000
3	Concrete for Mechanical Screen	40	CY	\$ 500	\$ 400	\$ 35,683
4	Grit Removal System	1	EA	\$ 330,000	\$ 40,000	\$ 370,000
5	Influent Pumps, wetwell, control	1	LS	\$ 150,000	\$ 100,000	\$ 250,000
6	Equipment Buildings	4000	SF	\$ 40	\$ 45	\$ 340,000
7	UV Disinfection	1	EA	\$ 135,000	\$ 100,000	\$ 235,000
8	Concrete for UV Channel	40	CY	\$ 500	\$ 400	\$ 36,000
9	Belt Filter Press	1	EA	\$ 415,500	\$ 80,000	\$ 495,500
10	Site Piping	1	LS	\$ 200,000	\$ 300,000	\$ 500,000
11	Effluent Pump Station & Force Main	1	LS	\$ 200,000	\$ 125,000	\$ 325,000
12	Aqua SBR	1	LS	\$ 514,230	\$ 250,000	\$ 764,230
13	Post Equalization Equipment	1	LS	\$ 220,385	\$ 100,000	\$ 320,385
14	Aerobic Holding Tank Equipment	1	LS	\$ 314,835	\$ 100,000	\$ 414,835
15	Concrete Tanks (SBR, PEQ, Aerobic Holding)	1,300	CY	\$ 500	\$ 400	\$ 1,170,000
16	Denite Equipment	1	LS	\$ 707,520	\$ 130,000	\$ 837,520
17	Concrete for Denite Equipment	120	CY	\$ 500	\$ 400	\$ 108,000
18	Concrete for Cascade Equipment	10	CY	\$ 500	\$ 400	\$ 9,000
19	Chemical Addition	1	LS	\$ 120,000	\$ 80,000	\$ 200,000
20	Process and Control Building	1	LS	\$ 600,000	\$ 350,000	\$ 950,000
				Subtotal		\$7,639,153
Conveyance System Improvements						
21	Demolition and Renovation at Existing WWTP	1	LS	\$ 75,000	\$ 225,000	\$ 300,000
22	Pumps, Controls, Renovations of Rob Vanary Park PS	1	LS	\$ 150,000	\$ 121,000	\$ 271,000
23	New Pump Station at Existing WWTP Site	1	LS	\$ 300,000	\$ 205,400	\$ 505,400
24	New Force Main (6" PVC)	6,800	LF	\$ 35	\$ 45	\$ 544,000
25	New Force Main (4" PVC)	100	LF	\$ 30	\$ 45	\$ 7,500
				Subtotal		\$1,627,900
General						
26	Construction Stake Out	0.5%			\$46,335	
27	E&S, SW management	1%			\$92,671	
28	Paving and Restoration	2%			\$185,341	
29	Electrical/HVAC/Mechanical (15%)	15%			\$1,390,058	
30	Bonds and Insurance (1%)	1%			\$92,671	
31	Mob and Demob (4%)	4%			\$370,682	
32	Contingency	25%			\$2,316,763	
				Total Construction	\$13,761,574	
				Subtotal	\$13,761,574	
33	Legal, Admin, Engineering, Design	10%			\$1,376,157.42	
34	Bidding, Construction Review, Inspection	5%			\$688,078.71	
				Total Project Cost		\$15,825,810

c. Environmental Review

The potential project area was reviewed with regards to its immediate and long-term environmental impacts. While the future WWTP site location is undetermined, for the purposes of this report the environmental review project area is based on the potential conveyance system and new WWTP site as outlined in Section 4. The construction and operation of the proposed WWTP and conveyance system will not lead to negative impacts to federal or state identified species, wetlands, or environmental resource and expected because of the proposed project. Best management practices for erosion and sediment control must be implemented during construction to protect the surrounding environment. Additional design considerations must be given to the finalized WWTP site and the conveyance systems to it to ensure there is no impact to wildlife, wetlands, or waterways.

An overview of registered critical areas, wetlands, and floodplains are shown in the figures below. Resources for these figures include USDA, MDE, FEMA, and U.S. Fish and Wildlife. As the potential project area borders the Chester River, there are many diverse environmental features branching off the river. The figure below shows wetlands in the project area per MDE and USFW resources. The wetlands within a 50' buffer of the proposed project area include riverine, palustrine, freshwater emergent wetlands, freshwater forested and shrub wetlands, and freshwater ponds. There are no critical habitats in the project area per U.S. Fish and Wildlife Service resources. Endangered species in the project area include monarch butterfly, and nine species of migratory birds of conservation concern are present. Additional wetland delineation is recommended to be performed following the selection of a WWTP site. The proposed project is not expected to impact any of these wetlands if best management practices are followed during detail design and construction. Non-invasive construction methods should be considered as well, such as trenchless pipe installation.

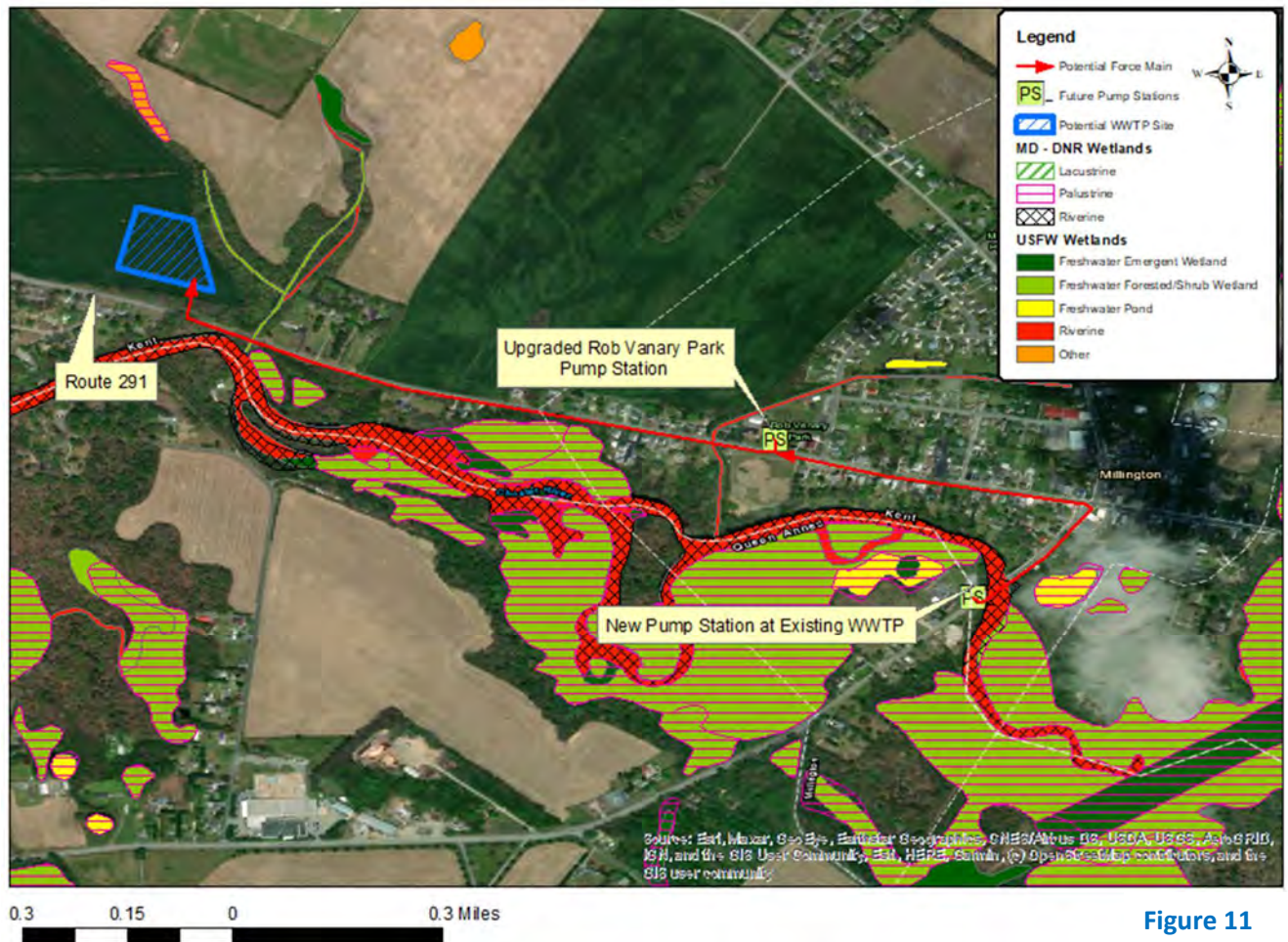


Figure 11

The figure on the following page shows flood plains within the proposed project area. The potential WWTP site is located within an area classified with a minimal chance of flooding. The potential forcemain does travel through, and next to flood zones for most of the alignment. Additional considerations should be given to scheduling and alternative methods during construction to limit the impacts of working in a flood zone.

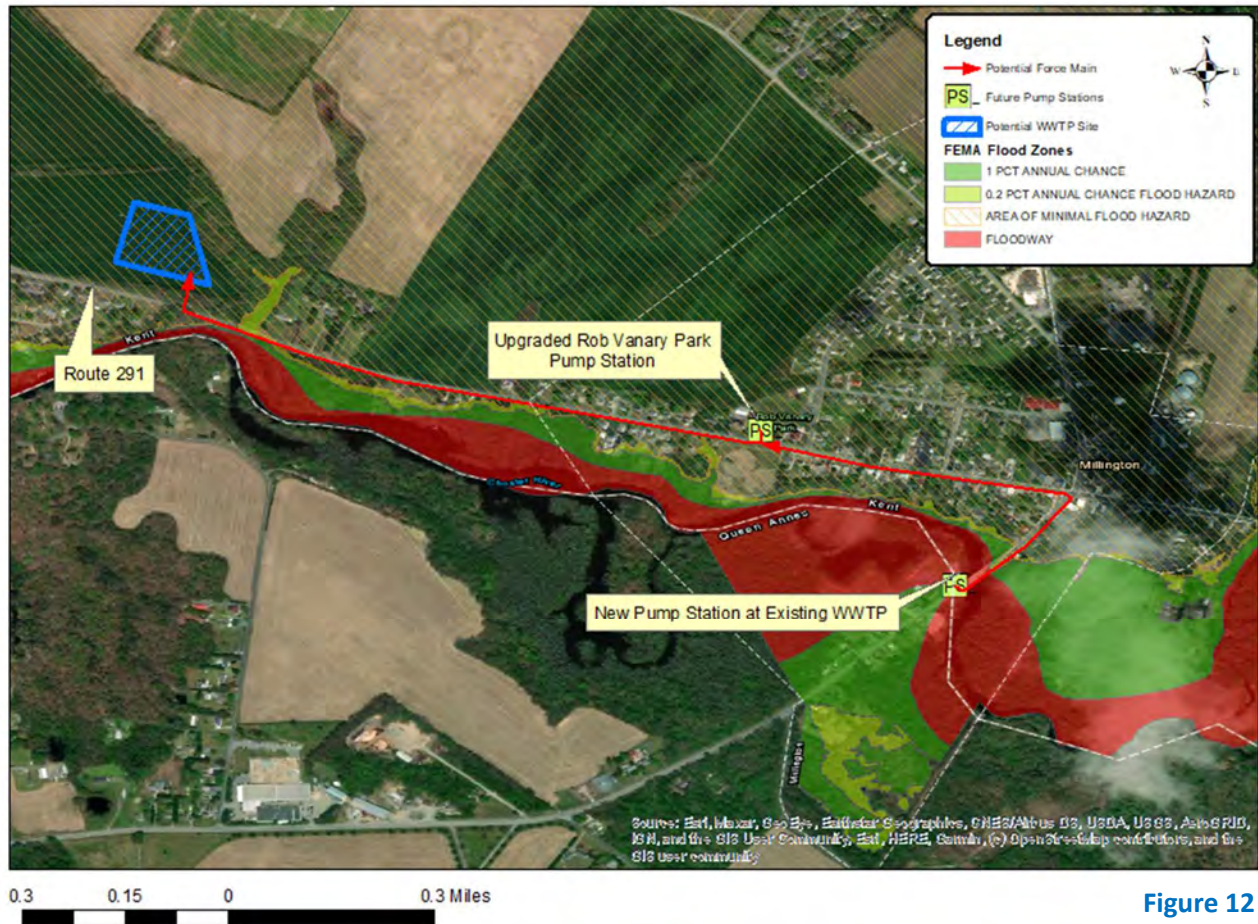


Figure 12

The current NPDES discharge permit includes annual, monthly, and weekly load limits of BOD5, TSS, total phosphorus, and total nitrogen. The permit also has maximum monthly average concentrations of E Coli, Enterococci, residual chlorine, and pH along with minimum concentrations of DO. Based on current TMDL requirements, any new WWTP reaching standard ENR standards will have a maximum discharge flow. A new WWTP will max out the Chester River at approximately 366,000 gallons per day of ENR effluent, with total nitrogen being the limiting factor. All effluent flow beyond the limits set for discharge into the Chester River will require beneficial reuse. For the purposes of this report, a beneficial reuse conveyance system and disposal alternative was not investigated further.

Based on the potential WWTP site on the northern side of Rte. 291, treated effluent will need to cross the roadway to discharge into the river. This will require easements and additional conveyance system equipment. For the purposes of this report, a simplified path for the effluent was used but additional considerations should be given to the finalized discharge location, and stream discharge structure.

Section 7 - Implementation

There are several funding sources traditionally available for this type of WWTP project. State and Federal opportunities include ENR funding, BRIC funding, and USDA affordability funding. All available funding sources should be considered during future planning. Additionally, developer contributions is recommended to fund the majority of the proposed project because the new WWTP is being upgraded in size to accommodate their plans. Based on the considerable facility size increase proposed, and as most new flows are from the potential developer sites, it is recommended that approximately 2/3 of the total costs be contributed by developers. This ratio is in line with the future ratio between the existing Town and Kent County service area and the future areas to be developed. The new WWTP will be sized to serve approximately 1,400 EDUs (at 250 GPD each), and just 521 of those EDUs will be from the existing Town and Kent County service area. Based on the cost estimate previous provided, the total project cost equals out to approximately \$11,400 per EDU.

The Town and County should attempt to secure additional grant and low interest loan funding to keep the impact to existing users to a minimum. It is likely that the project would be eligible for ENR grant funding through the Bay Restoration Fund. However, this funding is limited to existing users. Eligible expenses are prorated by the ratio of existing to proposed capacity. The current project approach would result in approximately 30% prorated grant funding for eligible items. However, not all treatment upgrades will be eligible, so the total grant funding will likely be 20-25% of the total project costs. Alternate phasing plans may be considered to improve this percentage. In addition to ENR grant funding, other sources such as USDA and FEMA BRIC funding to help further offset the cost to existing users (and total users).

User rate for the sewer service provided are recommended to be reviewed and adjusted as needed to account for the changes in O&M costs and debt service (capital costs) to fund this size of project. The new WWTP will serve more than three times the number of customers as the existing WWTP during the initial phase. User rates should be periodically monitored and reviewed as the new WWTP grows and more customers are added to its service area.

The proposed project timeline greatly depends on the action of local developers to have available sewer service and the finalization of a WWTP site selection. The actual date that each phase of the proposed project is completed will vary, as previously discussed, but the general time for completion of each phase is provided below. This timeline is based on similarly sized WWTP projects undergoing similar upgrades. In total, it is estimated that the total proposed project time will take 3 years and 9 months to complete. This includes the design and engineering phase, permitting and funding phase, bid phase, and construction of the entire proposed project. Portions of the conveyance system upgrades could be completed independently of the new WWTP if the site location becomes finalized early on that may speed up and streamline schedules.



APPENDIX A:

POTENTIAL SITE LAYOUT & PROCESS DIAGRAMS

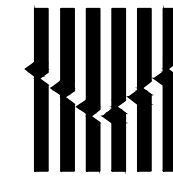


SIGNATURE:	
Drafting: AMW	Check: DRS
Design: AMW	Check: DRS
SCALE: 1" = 50'	
DATE:	10/7/2022
KCI JOB #:	1322011169
SHEET:	

PROFESSIONAL CERTIFICATION
I HEREBY CERTIFY THAT THESE DOCUMENTS WERE
PREPARED OR APPROVED BY ME, AND THAT I AM A
DULY LICENSED PROFESSIONAL ENGINEER UNDER
THE LAWS OF THE STATE OF MARYLAND.
LICENSE NO.: _____
EXPIRATION DATE: _____

KENT COUNTY MARYLAND REGIONAL WWTP POTENTIAL LAYOUT

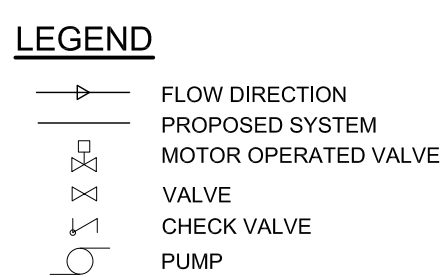
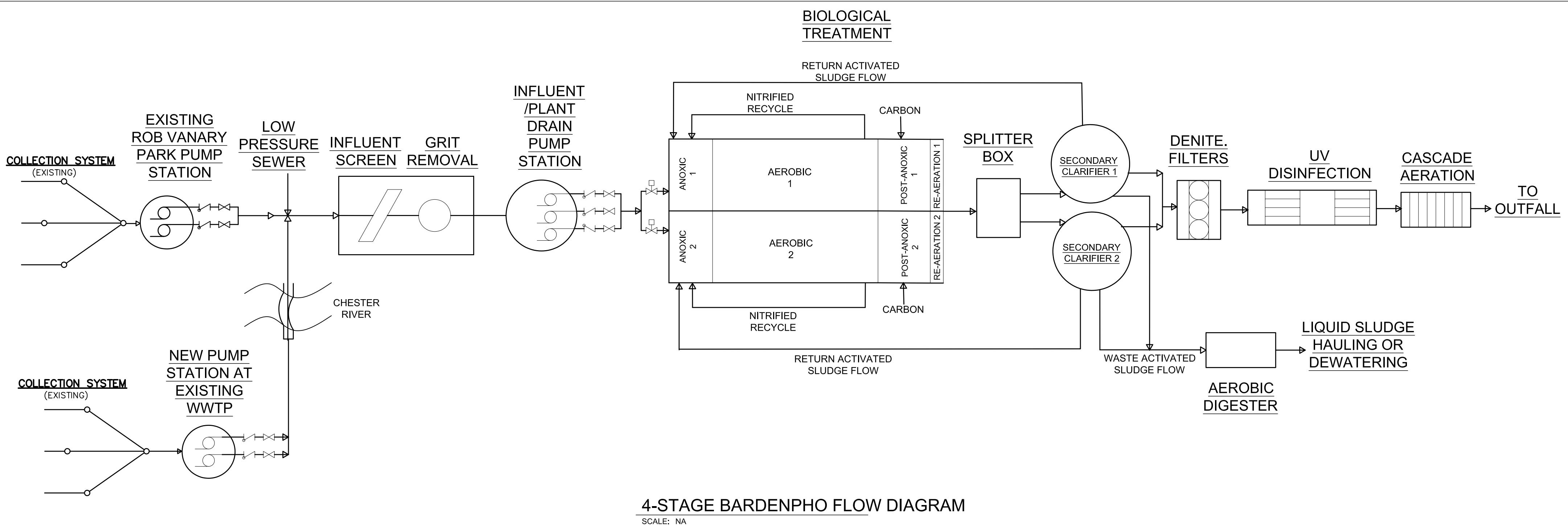
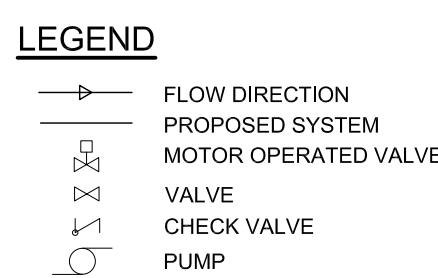
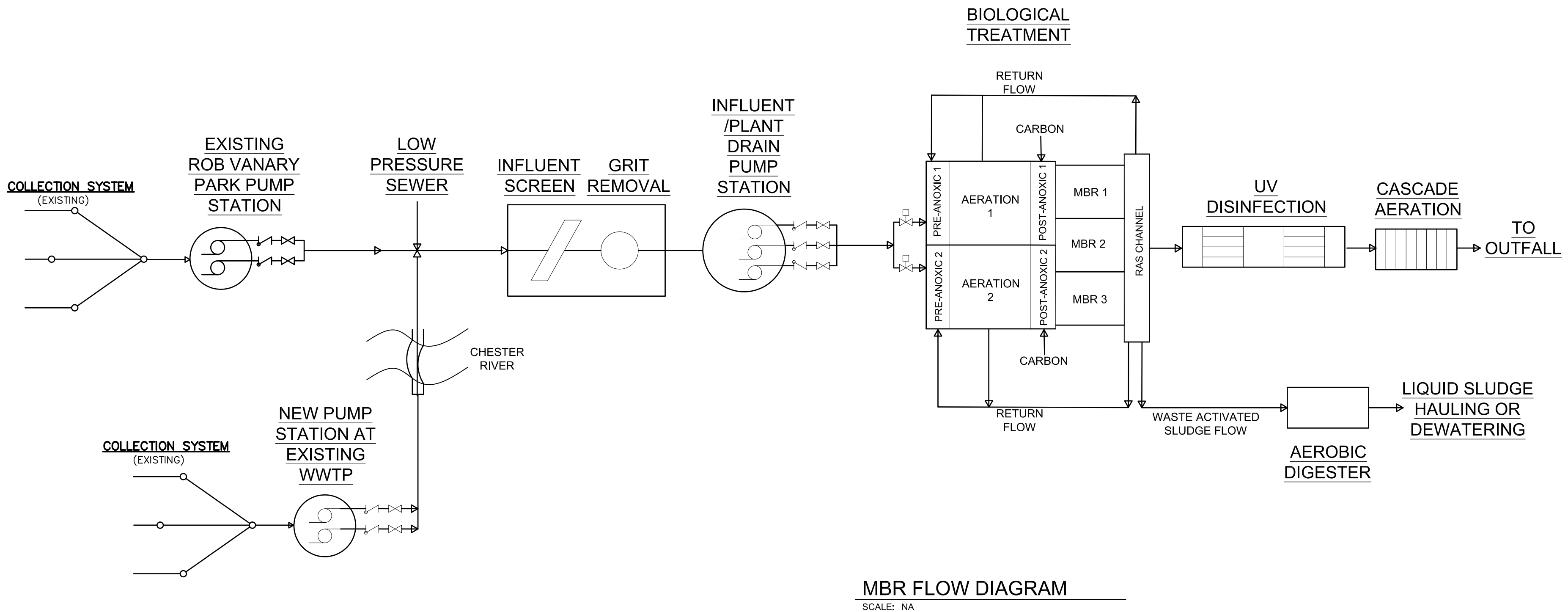
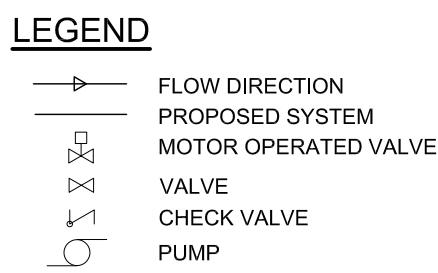
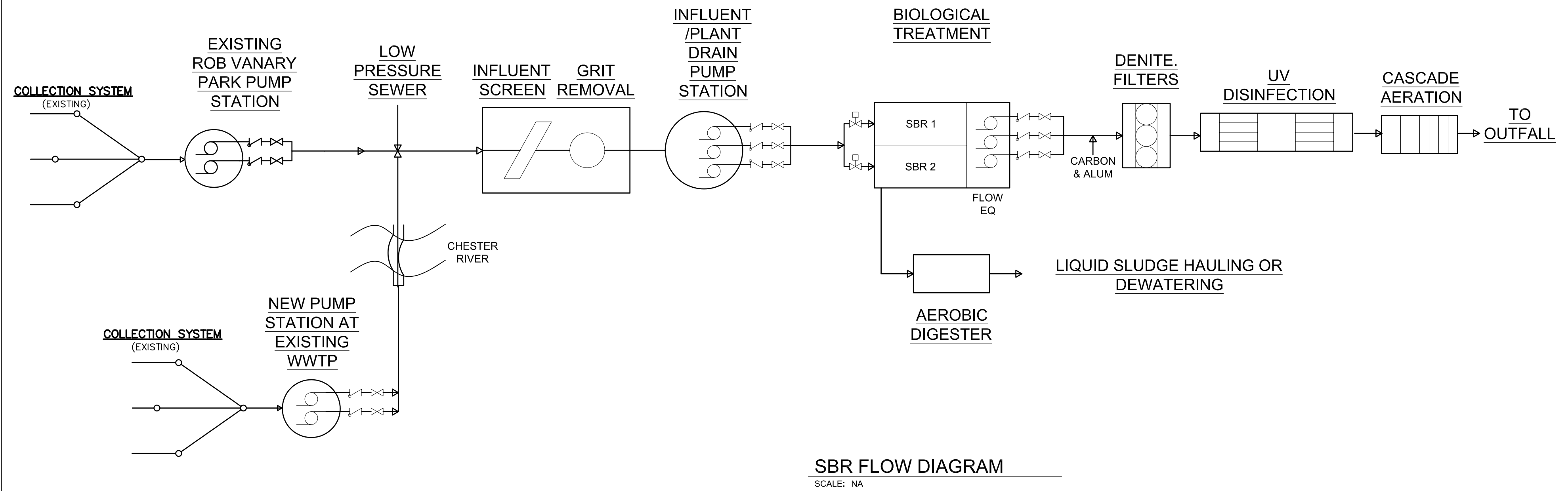
TOWN OF MILLINGTON KENT COUNTY MARYLAND



ENGINEERS - PLANNERS - SURVEYORS
614 N. DuPont Highway, Suite 100 Dover DE, 19901
PHONE: (302) 747-5999 FAX: (302) 731-7807 Website: www.kci.com

OWNER/DEVELOPER:
KENT COUNTY
400 HIGH ST.
CHESTERTOWN, MD
PA 410 778 4600

[illegible]



APPENDIX B:

EQUIPMENT PROPOSALS

Budget Proposal

Project:

Millington WWTP

Equipment:

FSM Perforated Filter Screen Model FRSIII 400 x 3075/6

FSM Screenings Wash Press Model SPW 200-700

Represented By:

Envirep

William LaPorte

Phone: 717.433.7837

Email: wlaporte@envirep.com

Regional Sales Manager:

SAVECO North America, Inc.

Formerly Enviro-Care

Brian Serio

Phone: 224.302.0315

Email: brian.serio@savecowaterna.com

Project No.: WEC222344

October 3, 2022



SAVECO® North America, Inc.
Formerly Enviro-Care®
1570 St. Paul Ave.
Gurnee, IL 60031
P: 815.636.8306 • F: 847.672.7968
www.enviro-care.com • ecsales@enviro-care.com

ITEM: "A" - One (1) FSM Perforated Filter Screen
Model FRSIII 400 x 3075/6



BASIS OF DESIGN (EACH)

Application:	Municipal Wastewater
Screen Perforated Opening:	6 mm
Angle of Screen:	3075 degrees from horizontal
Channel Width:	24 inches
Channel Depth:	4.0 feet
Discharge Height:	4.0 feet (above top of channel)
Wash Water:	16 gpm at 40 – 60 psi
SCR (Screenings Capture Ratio):	85%

PHASE 1 DESIGN

Peak Flow:	1.33 MGD
Downstream Water Level:	6.75 inches @ Peak flow
Headloss:	1.7 inches @ Peak flow with 0% blinding
	11.3 inches @ Peak flow with 30% blinding

PHASE 2 DESIGN

Peak Flow:	2.09 MGD
Downstream Water Level:	9.32 inches @ Peak flow
Headloss:	2.6 inches @ Peak flow with 0% blinding
	12.2 inches @ Peak flow with 30% blinding

PERFORATED PANEL TRAVELING BELT SCREEN (EACH)

- Fully automatic self-cleaning FSM screen complete with all appurtenances – 304 stainless steel.
- Main frame constructed from type 304 stainless steel.
- Flanged baseplate for mounting screen assembly to top of channel – 304 stainless steel.
- Screen support rails from UHMW-PE provided front and back on each side of frame.
- Replaceable UHMW-PE seals mounted to each side of frame.
- Replaceable bottom seals – Buna-N rubber and triple layer polyester brush with 304 stainless steel adjustable holder.
- Perforated filter screen elements from 3 mm thick (12 gauge) type 304 stainless steel, bolted to drive chain with 304 stainless steel bolt ny-lock nuts and washers.
- Screen drive roller chain from 304 stainless steel with specially hardened bushings, and pins from stainless steel and rollers from PA6.
- Stainless steel chain and screen elements driven by two (2) drive shaft mounted stainless steel sprockets with minimum thickness of 0.75 inches.
- Lower rotating guide sprockets from type 304 stainless steel, wear areas hardened, with life seal bushings, and a stub shaft from type 316 stainless steel.
- Drive tensioners – 304 stainless steel.
- Drive system to include 1.0 HP 1760 rpm TEFC-XP (Class I, Division 1, Group D) gearedrive motor suitable for 460/3/60 electrical supply.
- Nylon screen cleaning brush, automatic self-adjusting, with stainless steel drive shaft and 2.0 HP 1760 rpm TEFC-XP (Class I, Division 1, Group D) geared motor suitable for 460/3/60 electrical.
- Rotary Deflector from type 304 stainless steel on back side of screen auxiliary driven by screen drive.
- Internal spray system to clean internal surfaces of screen panel from stainless steel with PVDF nozzles, complete with manual ball valve and solenoid valve.
- Removable 304 stainless steel odor control enclosures/covers.
- Screenings discharge chute with hinged hood – 304 stainless steel.
- Anchor bolts – 304 stainless steel.
- Fasteners – 304 stainless steel.
- Shop surface preparation, stainless steel full dip passivation.

CONTROL PANEL AND INSTRUMENTATION (EACH)

- One (1) NEMA 4X type 304 stainless steel wall mount main control panel suitable for 480/3/60 electrical supply. Control panel shall contain the following control devices for operation of the filter screen.
 1. Main disconnect with through door interlock handle.
 2. Control transformer 480/120.
 3. Branch circuit protection.
 4. Screen and brush motor starters (IEC) with overloads.

5. Load monitor for screen motor overtorque/overload protection.
6. Emergency stop pushbutton.
7. HOA switch for each motor.
8. Open-Close-Auto switch for screen wash water solenoid valve.
9. Hour meter for each motor.
10. Run indicating lights.
11. Alarm lights indicating overcurrent and starter overload.
12. Alarm reset pushbutton.
13. Programmable control relay for screen control logic functions.
14. Run and alarm auxiliary contacts.
15. Barrier relay for safety microswitch.
16. UL Label.

- One (1) NEMA 7 Emergency Stop pushbutton station.
- One (1) safety microswitch suitable for area classification, mounted to the hinged hood.
- One (1) NEMA 7 (Class I, Division 1) 120 VAC, brass body wash water solenoid valve.
- Ultrasonic Differential Level Controller and Sensors – One (1) Pulsar Ultra-5 ultrasonic controller with one (1) upstream sensor and one (1) downstream sensor for screen start. The controller shall have 5 internal relays. Each sensor shall have a range of 1-20 ft and be supplied with a 33 ft integral cable and shall be suitable for installation in a Class I Division 1, Group D hazardous area, with stainless steel mounting bracket.

SPARE PARTS (TOTAL)

- None.

FIELD SERVICE (TOTAL)

- Site service of one (1) trip for a total of two (2) days for installation inspection, startup and operator training.

CLARIFICATIONS/COMMENTS

- None.

OPTIONAL ITEMS

- None.

NOTE: ANY ITEM NOT LISTED ABOVE TO BE FURNISHED BY OTHERS

EXCLUSIONS

Taxes, electrical wiring, conduit or electrical equipment, piping, valves, or fittings, shimming material, lubricating oil or grease, shop or field painting, field welding, erection, hoist or lifting apparatus, detail shop fabrication drawings, performance testing, unloading, storage, concrete work, civil design, grating, platforms, stairs, hand railing, dumpster (except as specifically noted).

This proposal section has been reviewed for accuracy and is approved for issue:

By: Todd Campbell Date: October 3, 2022

ITEM: "B" - One (1) FSM Screenings Wash Press Model SPW 200-700



BASIS OF DESIGN (EACH)

Application:	Municipal Headworks
Screenings Capacity:	70 ft ³ /hr.
Inlet Opening:	700 mm (27.6 inches)
Screw Diameter:	200 mm (7.87 inches)
Discharged Material Dry Solids:	>40%
Volume Reduction:	60 – 85%
Weight Reduction:	60 – 85%
Fecal Reduction:	90% (<20 mg/g BOD5)
Wash Water:	11 gpm @ 20-40 psi

SCREENINGS WASH PRESS (EACH)

- Screenings wash press from type 304 stainless steel.
- Inlet hopper and spray header – 304 stainless steel.
- Screw auger with torque tube and nylon brushes fitted to screw flights to clean drainage trough perforations – shaft from high tensile steel with flights from Hardox 400.
- Tapered roller bearing with stainless steel body.
- Wear bars from Hardox® 400.
- 6 mm perforated curved drainage section from type 304 stainless steel.
- Drainage collection pan with 6 inch diameter outlet connection and 1 inch NPT flush water connection from type 304 stainless steel.
- Wash water piping from type 304 stainless steel.
- Inlet and outlet flanges from type 304 stainless steel.
- Discharge piping with 45 degree elbows from type 304 stainless steel.
- Discharge piping to have a manually controlled back pressure device from type 304 stainless steel with integral access box and bolted hatch.

- Wash press electric drive motor 3.0 HP TEFC-XP (Class I, Division 1, Group D) 1760 rpm suitable for 460/3/60 supply with gear reducer mounted directly onto auger drive shaft.
- Support legs, stand and frame from type 304 stainless steel.
- Anchor bolts from type 304 stainless steel.
- Fasteners from type 304 stainless steel.
- Shop surface preparation, stainless steel full dip passivation and painting as required.

CONTROL PANEL AND INSTRUMENTATION (EACH)

- The following control devices will be added to the screen control panel for operation of the screenings wash press.
 1. Branch circuit protection.
 2. Wash press motor starter (IEC), reversing with overloads.
 3. Load monitor for wash press motor overtorque/overload protection.
 4. HOA switch for motor.
 5. Open-Close-Auto switch for wash press wash water solenoid valve.
 6. Hour meter for each motor.
 7. Run indicating lights.
 8. Alarm lights indicating overcurrent and starter overload.
 9. Run and alarm auxiliary contacts.
- One (1) NEMA 7 (Class I, Division 1) brass body wash water solenoid valve.

SPARE PARTS (TOTAL)

- None.

FIELD

- Provided with screen start-up services.

CLARIFICATIONS/COMMENTS

- None.

OPTIONAL ITEMS

- None.

NOTE: ANY ITEM NOT LISTED ABOVE TO BE FURNISHED BY OTHERS.

EXCLUSIONS

Taxes, electrical wiring, conduit or electrical equipment, piping, valves, or fittings, shimming material, lubricating oil or grease, shop or field painting, field welding, erection, hoist or lifting

apparatus, detail shop fabrication drawings, performance testing, unloading, storage, concrete work, civil design, grating, platforms, stairs, hand railing, dumpster (except as specifically noted).

This proposal section has been reviewed for accuracy and is approved for issue:

By: Todd Campbell Date: October 3, 2022

BUDGET

Item	Equipment	Budget Price
A	One (1) FSM Perforated Filter Screen Model FRSIII 400 x 3075/6	\$238,500
B	One (1) FSM Screenings Wash Press Model SPW 200-700	\$70,300

Validity:

Prices are valid for a period of 30 days from the date of this proposal. Beyond 30 days, delivery is subject to prior sales.

Warranty Statement and Term:

SAVÉCO North America, Inc. warrants the supplied equipment to the original end user against defects in workmanship or material under normal use and service in compliance with the original design specifications and the maintenance requirements and instructions as found in the Operations & Maintenance Manual. All SAVÉCO North America supplied equipment is warranted for 12 months from date of start-up or 18 months from date of shipment, whichever occurs first.

Warranty Exclusions:

This warranty does not cover costs for standard and/or scheduled maintenance performed, nor does it cover consumables and SAVÉCO North America parts that, by virtue of their operation, require replacement through normal wear (aka: Wear Parts), unless a defect in material or workmanship can be determined by SAVÉCO North America. Wear parts are defined as brushes, rollers, spray nozzles, drum seals and other items specifically identified in the Operations & Maintenance Manual.

Warranty Coverage:

SAVÉCO North America's liability is limited to the supply or repair of defective parts returned, freight prepaid by buyer to a location specified by SAVÉCO North America. Repaired or replacement parts will be shipped to buyer prepaid via standard ground freight. Express or expedited shipments will be at the expense of the buyer.

Exclusions and Exceptions:

This Warranty excludes damage or wear to equipment caused by misapplication of product, improper maintenance, accident, abuse, unauthorized alteration or repair, Acts of God, or installation or operation that is non-compliant with SAVÉCO North America installation and operations instructions.

Limited Liability:

SAVÉCO North America shall not under any circumstances be liable for any incidental or consequential damages arising from loss, damage to property, personal injury or other damage or losses owing to the failure of SAVÉCO North America's equipment. The liability of SAVÉCO North America, Inc. is limited as set forth above within the time period set forth above.

Term: 15% with Submittal Approval
80% Net 30 Days after Shipment
5% Net 30 days after Startup. Startup not to exceed 180 days from equipment delivery.

Taxes: No sales or use taxes have been included in our pricing.

Freight: Prices quoted are F.O. B. shipping point with freight allowed to a readily accessible location nearest jobsite. Any claims for damage or loss in shipment to be initiated by purchaser.

Submittals: Full submittals will be supplied approximately 4 to 6 weeks after receipt and acceptance of purchase order at the SAVÉCO North America offices.

Shipment: Shipment time is approximately 20 to 22 weeks after receipt of approved submittal is received at the SAVÉCO North America offices. Under no circumstances will verbal approval be accepted.

Additional Field Service: This service may be scheduled at \$1,250.00 per day plus expenses or is available through a yearly service contract.

Material of Construction: SAVÉCO North America is providing the equipment from the type of material specified for this project. If from 304L stainless steel the concentration of chloride and hydrogen sulfide (H₂S) in the equipment operating environment shall be kept below the following values:

- Chloride <200 mg/L
- Hydrogen Sulfide (H₂S) <6ppm

If not already done so, SAVÉCO North America can provide the equipment from 316L stainless steel for a price adder for environments that exceed the values noted above.

Represented by



(717) 761-7884
(800) 733-7884
sales@envirep.com
www.envirep.com

FSM[®] Screw Wash Press

Heavy-Duty Screenings Washer

SPW





FSM® Screw Wash Press - SPW

Heavy-Duty Screenings Washer

A High Performance Wash Press that Easily Adapts to Sudden Load Changes

Waste disposal is a cost factor for every plant. The FSM SPW can reduce the volume and weight of screenings by 60 – 85% and achieve 40% dryness. The innovative washing function of the SPW achieves fecal reduction of <20 mg/g BOD5 which is > 95% of fecal matter in the solids being discharged. The result is clean, dry screenings with practically no odor and vector attraction at the headworks.

The FSM SPW is available in three sizes with screw diameters of 200, 300 and 350 mm. Screenings are discharged into the wash press hopper either directly from a screen or via conveyor. The shafted screw conveys the screenings through the washing cycle and on to dewatering and compaction. Liquid released from the solids is discharged downstream for further processing. The plant's biological process needs the organics; landfills do not.

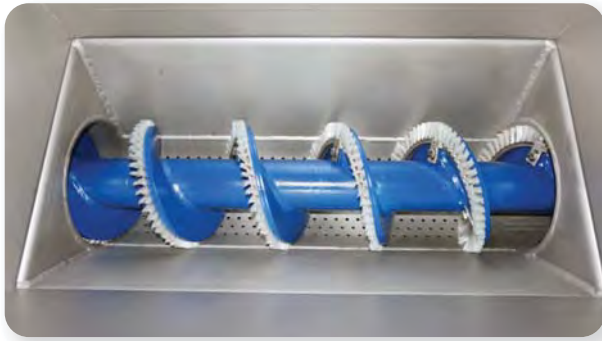
The built in washing device operates in a scrubbing function that breaks up, loosens and washes out fecal matter. An optional "whirl" agitator can be installed in the inlet hopper to further increase the washing function.



Applications

- Headworks screenings.
- Primary and secondary sludge screening.
- Power plant intake water screening.
- Other industrial applications such as:
- Pulp and paper debarking.
- Industrial waste water





Fully Welded Hardox Shafted Spiral.



Optional Screenings Cutter



Screenings Before and After Optional Screenings Cutter.



Features

- Through put up to 425 cfh in a single unit.
- Perforated drainage sections with counter sunk perforations to a maximum 6mm in diameter.
- Axial thrust bearing fully supports the screw and handles the compaction load and screw reversal.
- Durable stainless steel construction.
- Unsurpassed volume, dryness and fecal reduction.
- Completely enclosed for safe, odor-free operation.
- Can be fed by conveyor or sluice.



Manual Back Pressure Device Shown.

Options

- Hydraulic back pressure device – manual and automatic.
- Prewashing in the inlet hopper.
- Screenings cutter at discharge.
- Freeze protection.

Optional Back Pressure Devices For Increased Washing and Compaction

Manual - An operator controlled manual back pressure device located in the discharge pipe is available. Back pressure is generated by a stainless steel plate housed in a hinged access box.

Automatic - Back pressure is automatically generated by a hydraulic cylinder controlled in the main control panel. The pressure device is housed in a hatched access box which is integral to the discharge pipe.



Optional freeze protection available.



FSM® Duplex Wash Press – SPW350-D & SPW350-DM

Heavy-Duty Screenings Washer



This innovative wash press design has two wash press units side by side in a single press body. One inlet feeds the two wash press units. This SPW350-D can wash and dewater 700 cfh.



SPW 350-DM with optional impellers to increase washing function.

Represented by



(717) 761-7884
(800) 733-7884
sales@envirep.com
www.envirep.com



Enviro-Care
A WAMGROUP® Company

1570 St. Paul Avenue
Gurnee, IL 60031 U.S.A.
P. 815.636.8306 • F: 847.672.7968

ecsales@Enviro-Care.com
www.Enviro-Care.com

Represented by



(717) 761-7884
sales@envirep.com

FSM® Filterscreen

Perforated Plate Belt Filter Screen

FRSIII



Dalton, Georgia

The FSM Filterscreen has the highest Screenings Capture Ratio (SCR) at 85% using 6 mm perforated plate of all 59 screens independently tested at the Thompson RPM facility in the UK.



FSM® Filterscreen - FRSIII

Perforated Plate Belt Filter Screen

Highest Capture Perforated Plate Belt Filter Screen 85% Capture at 6 mm – Independently Tested and Verified.

FSM is the #1 supplier of perforated plate, belt screens in the world with over 1500 installations worldwide since 1987.

A continuous screen belt of perforated plate panels traps solid material on the surface of the screen and moves it to the upper deflection point where a brush cleans the debris from the plate. Depending on the length of the screen, a number of strategically placed lifting tines are located on certain plate panels. These tines are designed to capture gross solids and dislodge and remove rolling matter that accumulates in front of the screen at the base of the channel.



Kenosha Wisconsin

Features

- Verified 85% screen capture ratio.
- Self-adjusting brush maintains constant contact with the screen panels. (Patent Secured).
- Brush is primary cleaning mechanism.
- Minimal water usage for cleaning.
- No upstream coarse screening required.
- Handles large quantities of grease in the flow.
- Lifting tines capture coarse solids.
- Many gravity flow CSO and Combined Flow plant installations.
- Channel recess not required.
- Suitable for outdoor operation in cold climates.
- Low maintenance costs.
- Screen is completely enclosed for odor control.
- Self-adjusting brush can be retrofit to older FSM screens.

Technical Data

- Inclination: Inclination: 85°, 80°, 75°, 70°, 60°, 50°, and 45°.
- Perforations: 2 to 12 mm.
- Channel widths: to 10 feet.
- Discharge height: Up to 36 feet (standard) – larger sizes available.
- Chain life: 7 – 8 years.
- Brush life: +5 years (replaceable in sections)
- Lifting tines: Every 10th panel.
- Space between panels: <1 mm
- 304 SS construction (316 SS optional)

Municipal and Industrial Pre-Treatment of Wastewater



An optional screen bypass system is available. This is a hydraulic lifting system designed to raise the screen above the channel floor to allow flow to bypass the screen. Lifting the screen can be a less expensive alternative to the expensive civil work involved with constructing a bypass channel.

The lifting system is supplied with two hydraulic cylinders and a hydraulic power pack to control the cylinders. A local control station with a Screen Lift-Off-Screen Lower selector switch is supplied for manual operation of the hydraulic bypass system. The hydraulic power pack provides location flexibility which makes this a potential retrofit option.



Add a bypass without adding a channel.

Two Space Saving Screening Solutions



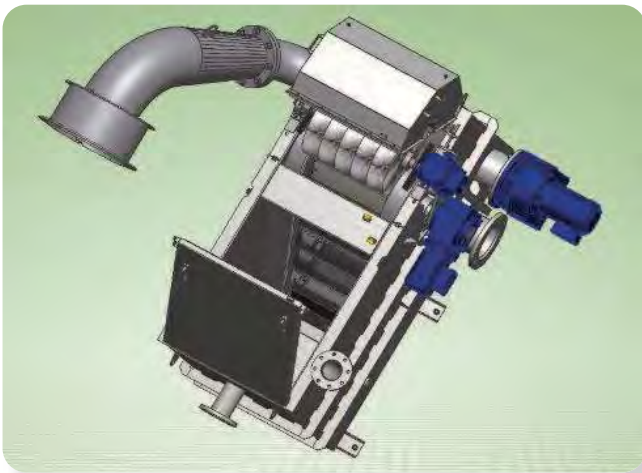
Rock River 80° Screen



Rock River Water Reclamation District

At this FSM headworks installation, gates located upstream of the screens limited the screens' angle of inclination to 80°. This posed no problem for FSM since they already had extensive experience with this type of installation and many 80° Filterscreens installed worldwide.

FSM tank units are a compact, cost effective solution to placing a high capture FRSIII Filterscreen and compactor in a single tank. The Filterscreen has the self-adjusting auto-brush and a simplified bypass tank solution.



A Pipe In, Pipe Out Solution



SAVÉCO
Member of WAMGROUP®

1570 St. Paul Avenue
Gurnee, IL 60031 U.S.A.
P. 815.636.8306 • F: 847.672.7968

ecsales@savecowaterna.com
www.savecowaterna.com



PISTA

GRIT REMOVAL SYSTEM

Budget Proposal

Project Location:
Millington MD

Proposal Date:
8/4/2022



BUDGET PROPOSAL

Thank you for your interest in Smith & Loveless regarding your grit system equipment needs.

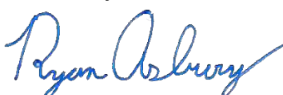
With the original introduction of the PISTA® Vortex Grit Removal System in 1973 to the now over 2900 units, we are pleased to submit information on our latest generation grit chamber, grit pump, and grit washing/dewatering equipment. A few key items:

- 1) The vortex grit chamber proposed is designed for 95% capture of grit ≥ 105 micron (140 mesh). Test data is available from numerous projects demonstrating these higher removal rates. A deduct can be provided if you want to proceed with conventional systems based on the original 1970s design. Our grit washer/dewatering equipment matches the particle capture of chambers with use of parallel plates in the receiving hopper. Remember, a properly designed headworks system will take into account the entire system removal, not only individual components.
- 2) While a vortex chamber looks like a clarifier, it is not a laminar or quiescent basin; the baffled PISTA® chamber design is based on a hydraulically induced vortex. With these generated currents grit removal doesn't rely on gravity-based settling or surface overflow rates (SOR). This means the vortex chamber isn't de-rated at peak flow and captures a wide range of particle specific gravities – not only limited to 2.65. Computational Fluid Dynamics (CFD) modeling and particle cut off equations demonstrating our system design can be provided.
- 3) With our decades of experience, we are helping to shape the grit industry and offer value to our customers with quality and proven technological advances. Value is a word that often gets over-used in buying and selling arenas and thus its true meaning itself is often de-valued. More than just meaning “better” or “lower” price, best value incorporates the total installed cost. Total installed costs include operating costs, durability of the equipment, and post-sale support. With the intent of properly investing in a modern design, with future goals, one must look past the emphasis on initial price and be best value conscious. There are at least three good ways to structure the bid format and be value conscious: pre-purchase, single source specification, or base bid specification (award on base bid). If you need additional details to maintain control over the selection of equipment, please contact us for specific examples or pros-and-cons of each format.

We would also invite your team to the manufacturing facility in Lenexa, KS to see our American Made products and a full scale 4 MGD R&D facility. This hands-on tool shows how the S&L equipment functions and can be utilized for operator training and certification. We can even custom build the grit feed entering the demo unit to your specific site needs.

Again, S&L and our local representative, appreciate this opportunity and look forward to offering further information as the project progresses, including CAD files, 3D Revit model(s), hydraulic analysis, grit characteristic evaluation and ongoing headworks design assistance backed by decades of industry leading experience.

Sincerely,



Ryan Asbury
Manager, Municipal Treatment Systems

BUDGET PROPOSAL

Solve Issues of Non-Performing & Under-Performing Grit Removal Systems



Grit Build Up in Digesters



Grit Deposition in Process Basins



Centrifuge Abrasion



Impeller Wear

BUDGET PROPOSAL

Manufacturer's History

Smith and Loveless (S&L) is the industry leader when it comes to vortex grit removal equipment. We have manufactured over 2,900 systems and continued to make advancements of 40 years with four generations of units.

Advancements in Grit Removal through the Decades

- 1973** 1st Gen PISTA - 270deg
- 1982** TURBO Grit Pump and Concentrator
- 1977** 1st Certified Grit Removal Efficiency Test
- 1985** NiHard TURBO Grit Pump
- 1988** 2nd Gen PISTA - 360deg
- 1989** Lamella Plates within a Classifier
- 2008** 3rd Gen PISTA - V-Force Baffle
- 2009** Sonic Start Streamline
- 2010** PISTA TURBO Grit Washer
- 2010** Skid Mounted Headworks - PISTAWORKS
- 2013** Grit Removal Research Center Opens
- 2014** 1st Gen PISTA - OPTIFLOW
- 2015** 4th Gen PISTA - VIO

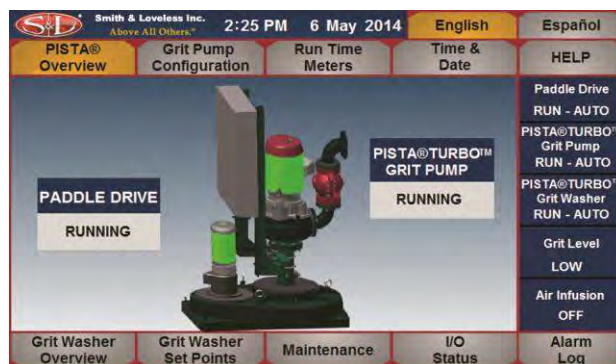
	270°	360°	OPTIFLOW	V-FORCE	VIO
Chamber Type	Conventional Vortex		Baffled Vortex		
300 micron	95% Removal		95% Removal		
210 micron	85% Removal		95% Removal		
150 micron	65% Removal		95% Removal		
105 micron	N/A			95% Removal	
Turndown	4:1			10:1	
Footprint	★	★★	★	★★	★★★
Depth	★★★	★★★	★★★	★★★	★★

One Manufacturer, One Complete System, One Point of Responsibility

S&L is the only manufacturer who makes equipment for the vortex chamber, pumps specifically designed to reliably move abrasive grit slurries, and dewatering classifiers or grit washers that retain fine grit. While the grit chamber is important, it is the system working together that matters.

QUICKSMART™ Touchscreen System Controls for PISTA®

QUICKSMART™ System Controls provide unparalleled ability to monitor and adjust grit removal functions including pumping, removal and washing. Control modifications, screen navigation and viewing of system status are simplified, while new features like a maintenance log displays periodic recommended operation / maintenance instructions and makes grit pump lubrication suggestions based on actual system run times. It features improved help/troubleshooting support and a new I/O Status screen that displays controller digital and analog I/O status.



BUDGET PROPOSAL



PISTA®

GRIT REMOVAL SYSTEM

- Latest Technology in Grit Removal
- Prevents Grit Deposition in Channels and Basins
- Retrofit In To Existing Chambers
- Low Head Loss

Highest Grit Removal Efficiency

95% of 105 micron and up versus antiquated specifications of as low as 65% grit removal. Protects downstream basins from deposition as well as pumps and sludge dewatering equipment from premature wear.

Smallest Footprint

7 times smaller than Aerated Grit Chambers and 3 to 4 times smaller than Detritors. Less depth than sloped floor circular chambers.

Handles Wide Variations in Flow

Provides 10:1 turndown from peak to minimum flow versus other systems that can only achieve between 3:1 & 4:1. Protects upstream channels from deposition during low flow periods.

Velocity Control

Automatically keeps the inlet velocity between 1.6 - 3.5 f/s to prevent grit deposition upstream of the PISTA.

Energy Savings

7 to 10 times less energy than Aerated Grit Chambers; PISTA® pumps and classifiers operate typically 4 times per day, 15 to 30 minutes each time.

Recessed Impeller Pump

Provides much higher velocity than airlifts to prevent grit plugging pump discharge lines.

Fewer Units Required

Single grit systems designed to handle up to 100 MGD.

Lowest Total Expenditure Cost

PISTA® provides significantly reduced capital costs and much lower operation and maintenance than other systems

BUDGET PROPOSAL

PISTA® Options

PISTA® PRO-PAK™: Weather & Freezing Protection

PISTA® PRO-PAK™ protects your **PISTA® TURBO™** Grit Pump against weather and freezing by mounting the critical grit removal system components inside of a retractable fiberglass enclosure. It is a cost-effective alternative to a building, while still offering freeze protection in harsh climates.



PISTA® WORKS™: All-in-One Skid Package

PISTA® WORKS™ features a complete headworks and grit removal scheme in a skid-mounted package. The all-in-one system features a screen and grit removal chamber, as well as all grit handling components including grit pump, concentrator and washer. All components are constructed of durable stainless steel.



Steel Tank and/or Influent Ramp or Shelf

Stainless steel packages are available including for tankage, influent ramp or shelf. The steel components are manufactured in pieces and welded together onsite.



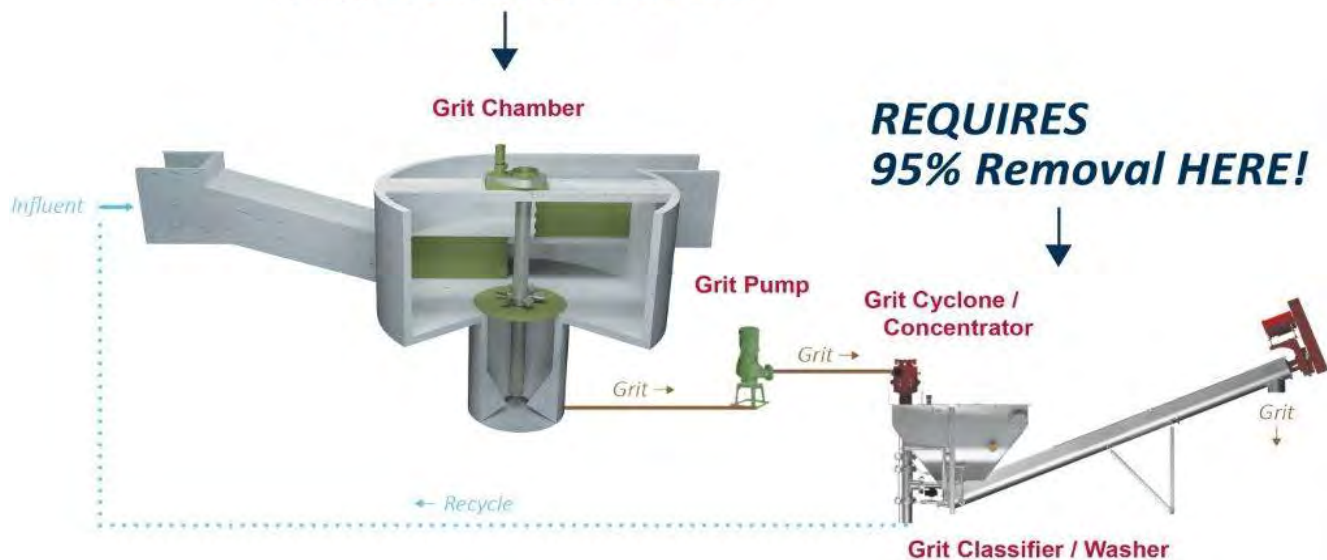
BUDGET PROPOSAL



Smith & Loveless Inc.

Proficiency of All Means Efficiency Together

95% Removal HERE...



Grit	300 micron	210 micron	150 micron	105 micron	Total
Regional Profile ¹	92.4%	3.7%	2.3%	1.6%	
Incoming to Plant (lb/day) ^{2,3}	305.6	12.4	7.7	5.1	330.8
Conventional Vortex					Total
Conventional Vortex ⁴	95%	85%	65%	45%	91%
Kreb Style Cyclone ⁴	85%	65%	55%	45%	
Grit Classifier ⁴	95%	85%	65%	45%	
Grit to Dumpster (lb/day)	286.9	9.4	3.1	0.7	300.1
Smith & Loveless Baffled Vortex					Total
Baffled Vortex ⁵	95%	95%	95%	95%	95%
2-piece Cyclone ⁵	96%	95%	94%	90%	
Grit Classifier with Lamella Plates ⁵	98%	96%	95%	94%	
Grit to Dumpster (lb/day)	289.4	11.7	7.3	4.8	313.2
Additional Grit (ft ³ /day)	0.1	Additional Grit (lb/day)			13.2
Additional Grit (yd ³ /year)	1	Additional Grit (ton/yr)			2
Based upon the ADF of 0.4 MGD, we have projected a yearly savings for Millington MD			\$1,253⁶		

¹ Assumed profile for Northeast US. This is projection based on compilation over 300 grit removal profiles.

² According to WEF, typically there is 5 and 10 cuft grit for every MGD of ADF, respectively for sanitary sewers and combined sewers.

³ Assumed grit specific gravity is 2.65 (EPA, and other S&L Studies).

⁴ Assumed values based upon testing of other units.

⁵ Values based upon CFD and/or full-scale factory testing.

⁶ Cost per ton based on "In-House Grit Removal System Design-Build Approach...", WEFTEC 2019 Presentation

BUDGET PROPOSAL

Online: smithandloveless.com • Phone: 913.888.5201 • FAX: 913.888.6503

© Copyright 2017, All Rights Reserved

PISTA BUDGET PROPOSAL

ESTIMATE VALID FOR 90 days (FOB Factory, Taxes Excluded)	
One (1) Model 2.5V PISTA® System for a VIO Concrete Chamber	\$ 263,095
One (1) 2.5 MGD 316SS Grit Chamber Mechanism and Wettable Internals	Included
One (1) 316SS VIO Baffle for Increased Grit Removal and Turndown	Included
One (1) Flooded Suction 250 GPM Grit Pump with NiHard Impeller and Volute	Included
One (1) 316SS Model 15 Classifier	Included
One (1) 250 GPM NiHard Concentrator	Included
One (1) NEMA 4X QuickSmart PLC Main Control Panel	Included
Two (2) Trips for Start-Up and Training over Three (3) Days	Included
Freight	Included
OPTIONS	
Adder for One (1) 316SS Model 250 Grit Washer (in lieu of Classifier)	\$ 29,430
Adder for One (1) Top Mounted Grit Pump (in lieu of Flooded Suction)	\$ 13,000
Adder for One (1) NEMA 4X Vacuum Priming Panel	Included
Adder for Recommend Spares for Increased Redundancy	\$ 1,500

ITEMS NOT INCLUDED

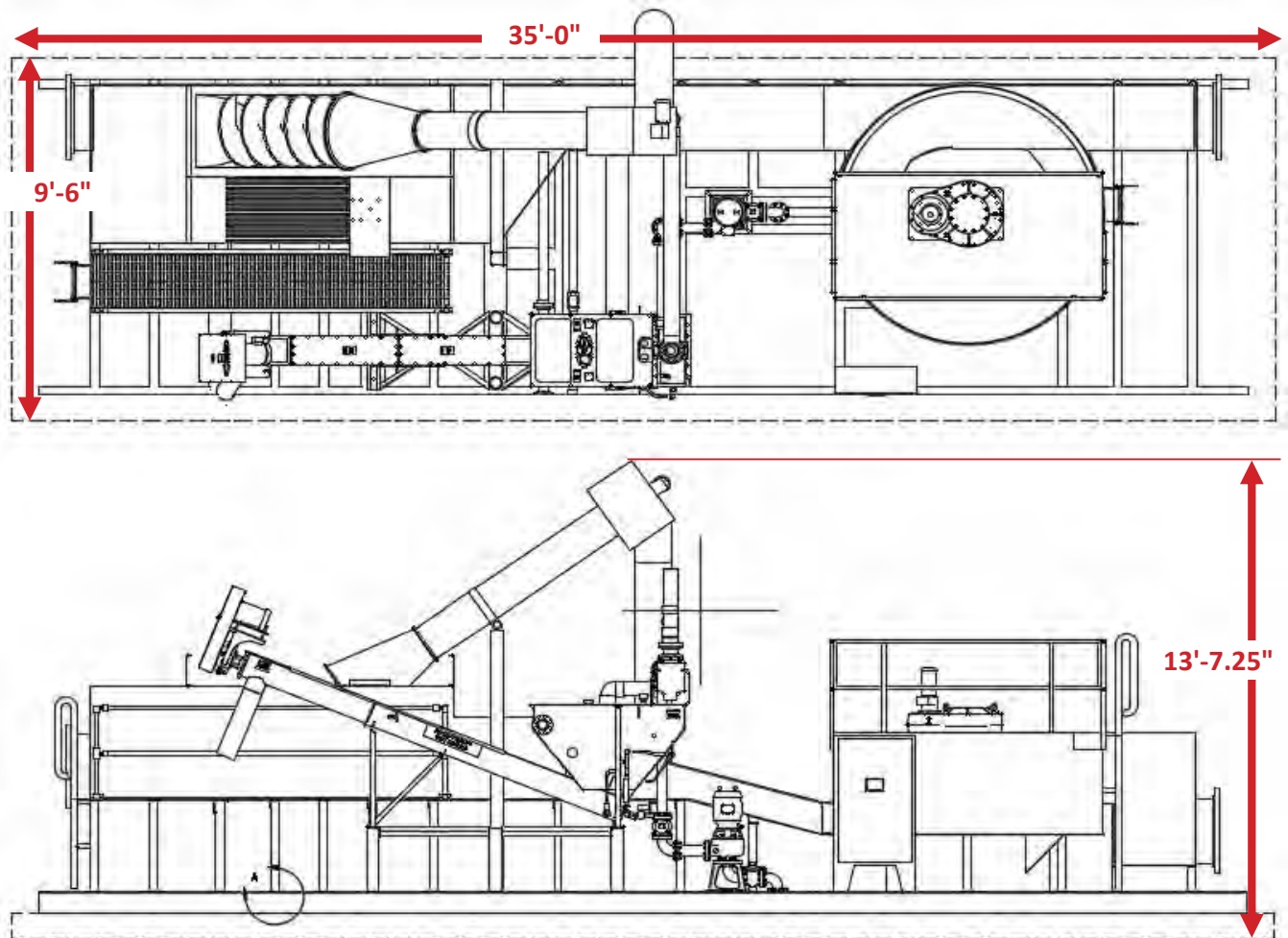
Grit Removal Efficiency Testing (if required)
 Seismic Calculations, and/or PE Stamp
 Explosion proof motors, controls, solenoids, etc
 Field assembly/erection or installation
 Interconnecting piping, wiring and conduit
 Field paint, painting, and final surface preparation
 Lubricants
 Anchorage, anchor bolts
 Grouting
 All concrete work (S&L can provide steel inlet ramps, shelf, or chamber if needed)

BUDGET PROPOSAL

PISTAWORKS® Complete Screening and Grit Removal All-in-One Package

- Pre-assembled and shipped, virtually eliminating construction costs
- Complete system design and compact footprint
(Assumes non-classified area for system. Explosion proof motor, conduit, and remote mount panel optional.)

ESTIMATE VALID FOR 90 days (FOB Factory, Taxes Excluded)	
One (1) Model 2.5B PISTAWORKS	\$ 590,000
One (1) 6 mm OBEX™ Spiral Fine Screen with manual bar screen bypass	Included
One (1) Grit Removal Chamber with V-Force Baffle for 95% of 105 micron	Included
One (1) PISTA Turbo Grit Pump, & One (1) 2-piece NiHard Grit Concentrator	Included
One (1) PISTA® TURBO Grit Washer	Included
One (1) NEMA 4X Control Panel with QuickSmart PLC	Included
All Items are 304SS or Aluminum except for the epoxy coated carbon steel skid	Included
Two (2) Trips for Start-Up and Training over Three (3) Days	Included
Freight	Included

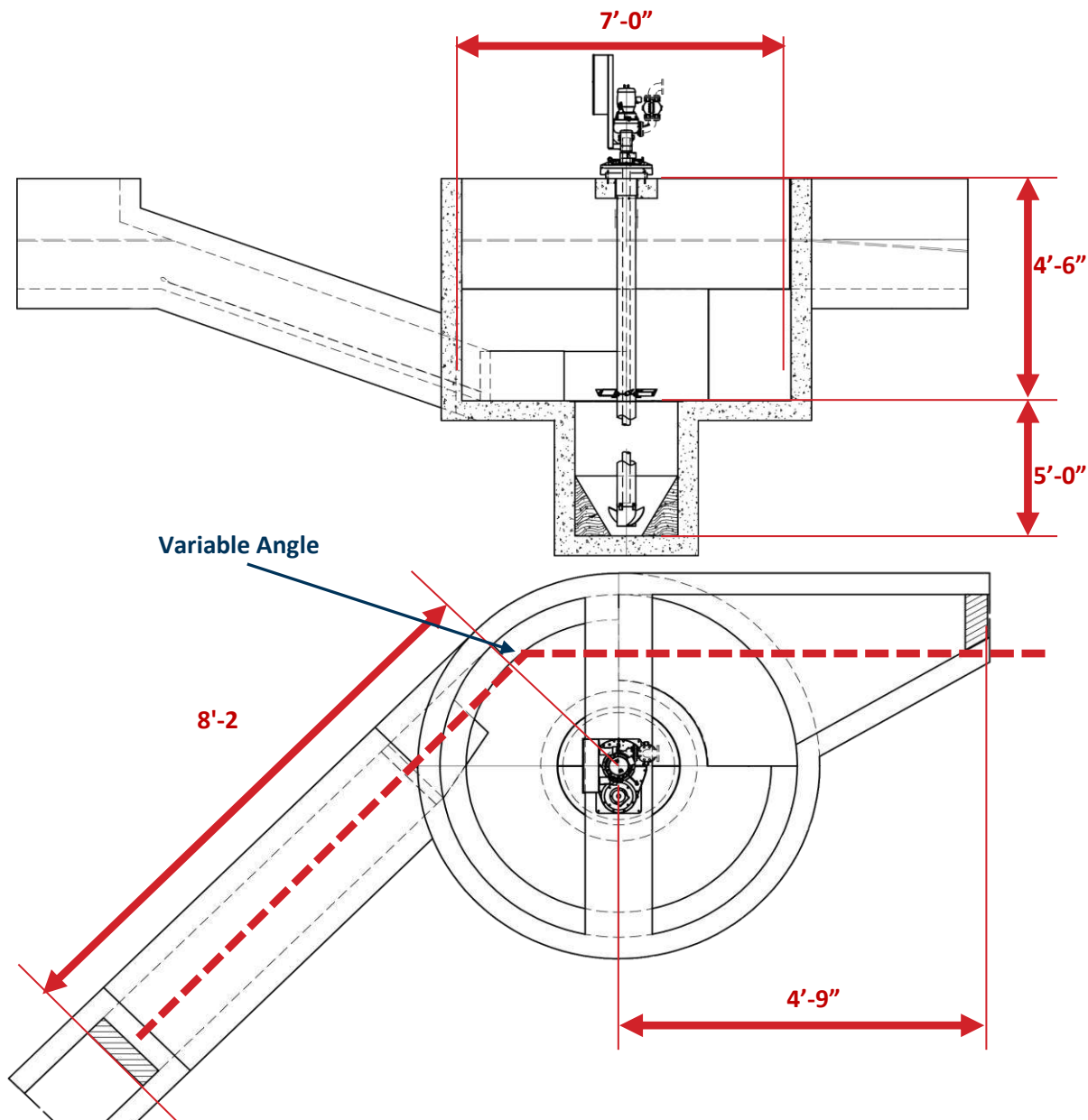


BUDGET PROPOSAL

PISTA VIO Layout (4th Generation Baffled Vortex)

Smith and Loveless offers both a top mounted vacuum prime grit pump and flooded suction grit pump. Both options have their pros and cons. Vacuum primed grit pumps can significantly reduce construction costs as no additional excavation next to the lower chamber is required. It also limits the addition of a possible confined space area.

The PISTA VIO offers the same removal as our PISTA with V-Force Baffle but allows for the inlet ramp to be rotate relative to the effluent channel.



BUDGET PROPOSAL

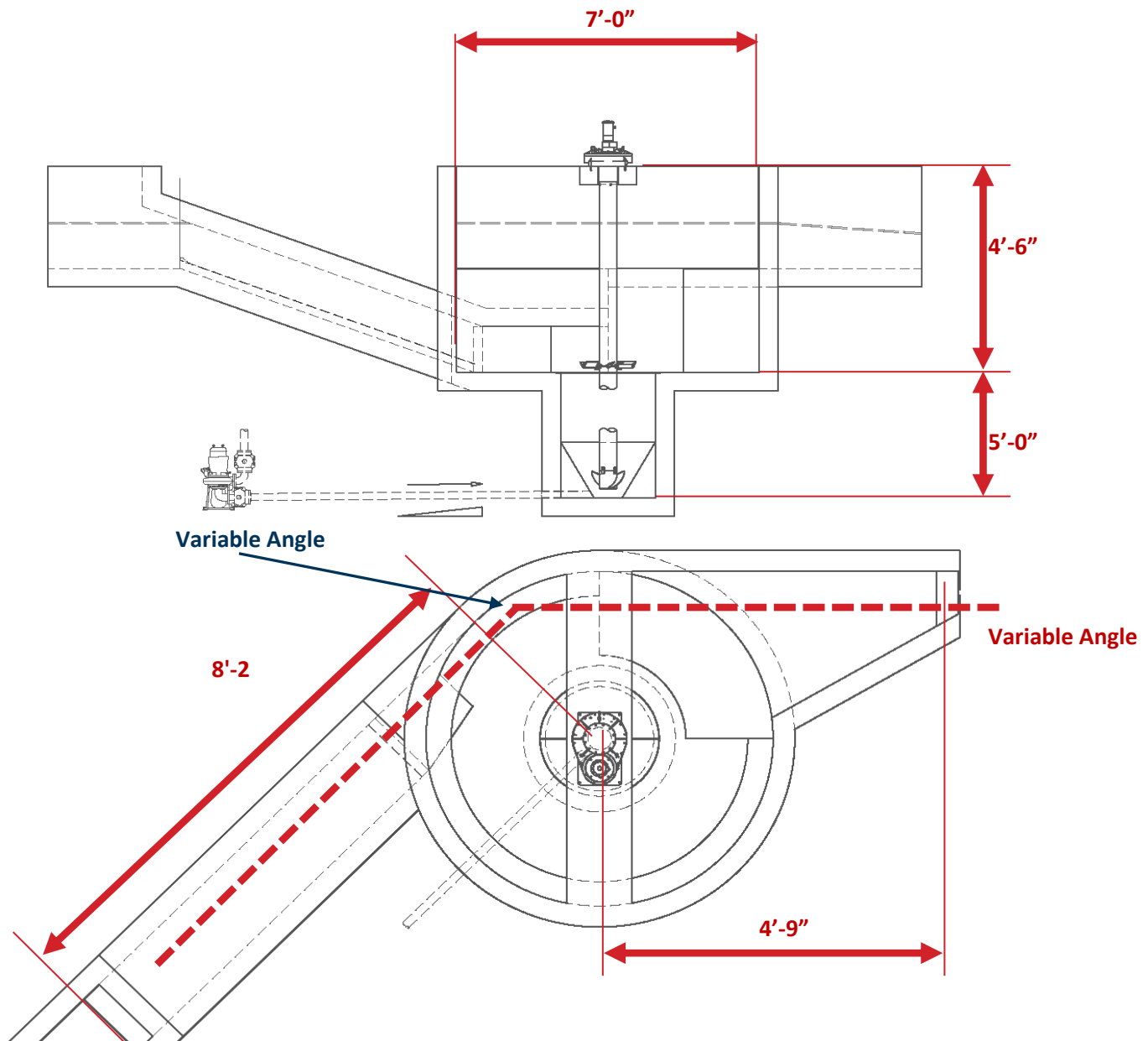
Online: smithandloveless.com • Phone: 913.888.5201 • FAX: 913.888.6503

© Copyright 2017, All Rights Reserved

PISTA VIO Layout (4th Generation Baffled Vortex)

Smith and Loveless offers both a top mounted vacuum prime grit pump and flooded suction grit pump. Both options have their pros and cons. Vacuum primed grit pumps can significantly reduce construction costs as no additional excavation next to the lower chamber is required. It also limits the addition of a possible confined space area.

The PISTA VIO offers the same removal as our PISTA with V-Force Baffle but allows for the inlet ramp to be rotate relative to the effluent channel.



BUDGET PROPOSAL

Online: smithandloveless.com • Phone: 913.888.5201 • FAX: 913.888.6503

© Copyright 2017, All Rights Reserved

PISTA® TURBO™ Grit Pump for Maximum Grit Pumping Efficiency

Smith & Loveless offers a grit pump and is the only manufacturer that can have a single point of responsibility. It incorporates a number of features for improved durability and serviceability.

- S&L uses a vertical, direct coupled pump versus a belt driven horizontal pump. Operators like not having belts to maintain, and appreciate the vertical arrangement of the S&L design.
- Vertical pumps allow for grit slurries to remain inside the pump volute when having to access the impeller via removal of the rotating assembly. The horizontal grit pumps when split open, allows the grit slurry to spill over the working area and process piping needs to be taken apart.
- S&L grit pumps take less space than the horizontal.
- S&L grit pumps don't require shaft sleeves to the carbons steel shaft, nor do they require wear plates. The S&L design is driven by a solid stainless steel shaft with a diameter of either 1 -7/8" or 2-1/8".
- Ni-Hard Impellers and Ni-Hard Volute allow for long life in an abrasive applications.
- Vertical pump configuration allows flexibility of installing the grit pump in a flooded suction or top mounted vacuum primed arrangement.
- For top mounted applications, S&L is the only manufacturer to offer vacuum primed grit pumps instead of wastewater cast iron self-primer that is not design for grit slurry applications.



BUDGET PROPOSAL

PISTA® DURALYTE® Grit Concentrator or Hydrocyclone

Smith & Loveless offers a hydrocyclone that has the same removal efficiency as our PISTA chamber. It incorporates a number of features to retain the finest grit, while still separating organics and water.

- 2-piece Design for Improved Durability and Serviceability.
- **PISTA® DURALYTE®** with Polyurethane Lower Cone for Typical Grit Applications.
- **PISTA® DURALYTE®** with Ni-Hard lower cone for Heavy Grit Applications
- Rejects 95% of putrescible material and 93% of grit slurry water
- Large discharge opening prevent clogs
- Optimized for 250 GPM (4" piping) and 500 GPM (6" piping)
- When pin-hole leaks are visible in the lower cone, it is time to replace.
Replacement time can be found below.
- Other hydrocyclones have liners that have to be checked and replace quarterly. Every year that is 12-18 man-hours to remove the hydrocyclone, take it apart, check liners, and put it all back together. If that maintenance is missed, the costly body of the hydrocyclone must be replaced.

PISTA® DURALYTE®

Polyurethane Bottom Cone

Replacement Time about 20 minutes

Typical Lifespan of 1-3 years



PISTA® DURALYTE®

Ni-Hard Bottom Cone

Replacement Time about 60 minutes

Typical Lifespan of 3-5 years

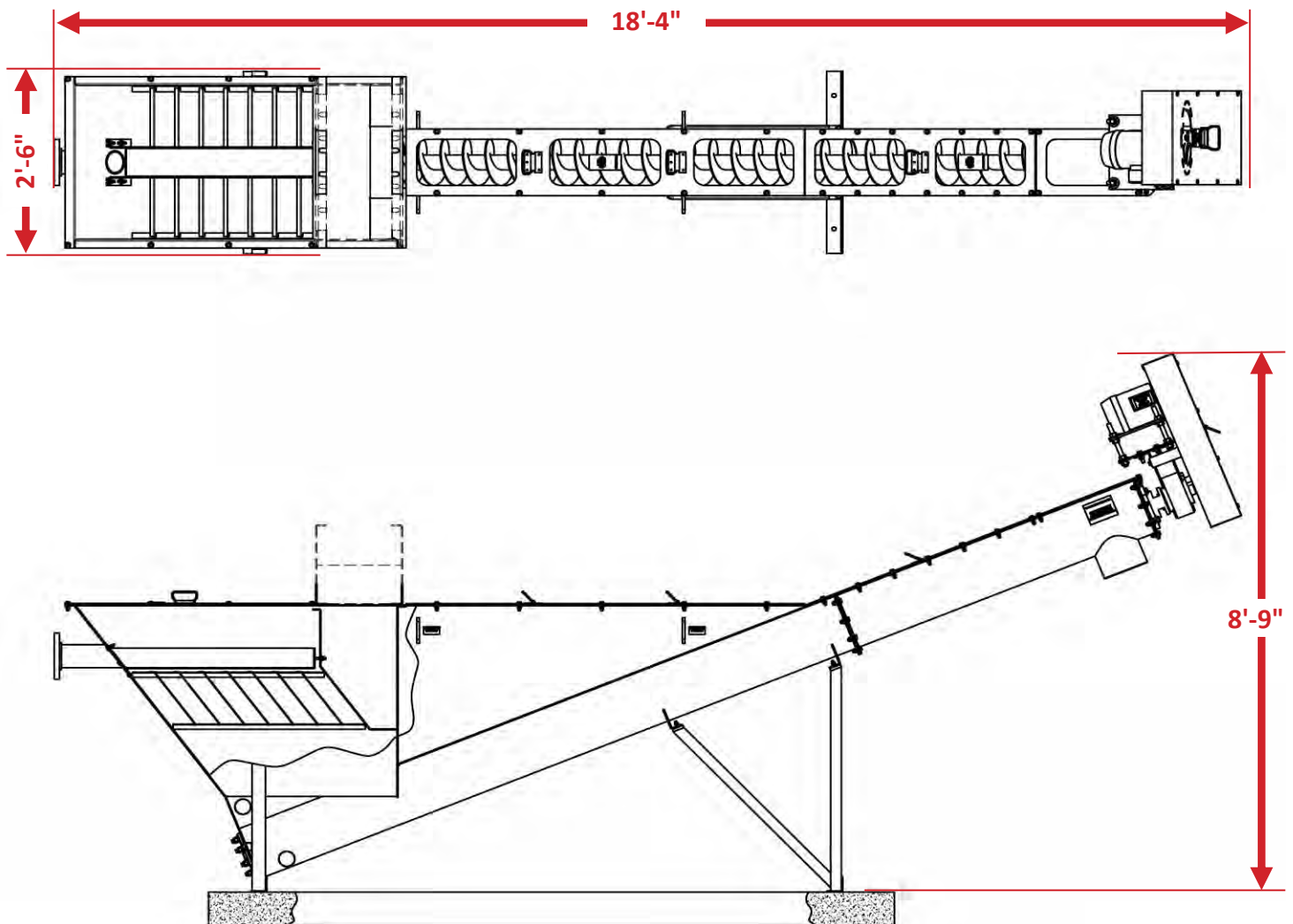


BUDGET PROPOSAL

Model 15 Classifier (Dewatering Screw Conveyor)

Smith & Loveless offers a grit classifier that has the same removal efficiency as our PISTA chamber. It incorporates a number of features to retain the finest grit, while still separating organics and water.

- Lamella plates in the settling area retain fine grit while still floating off organics
- Screw and trough don't come into contact to highly reduce wear (wear shoes or liner aren't required or recommended)
- Long auger means more auger out of the water for dryer grit in the dumpster

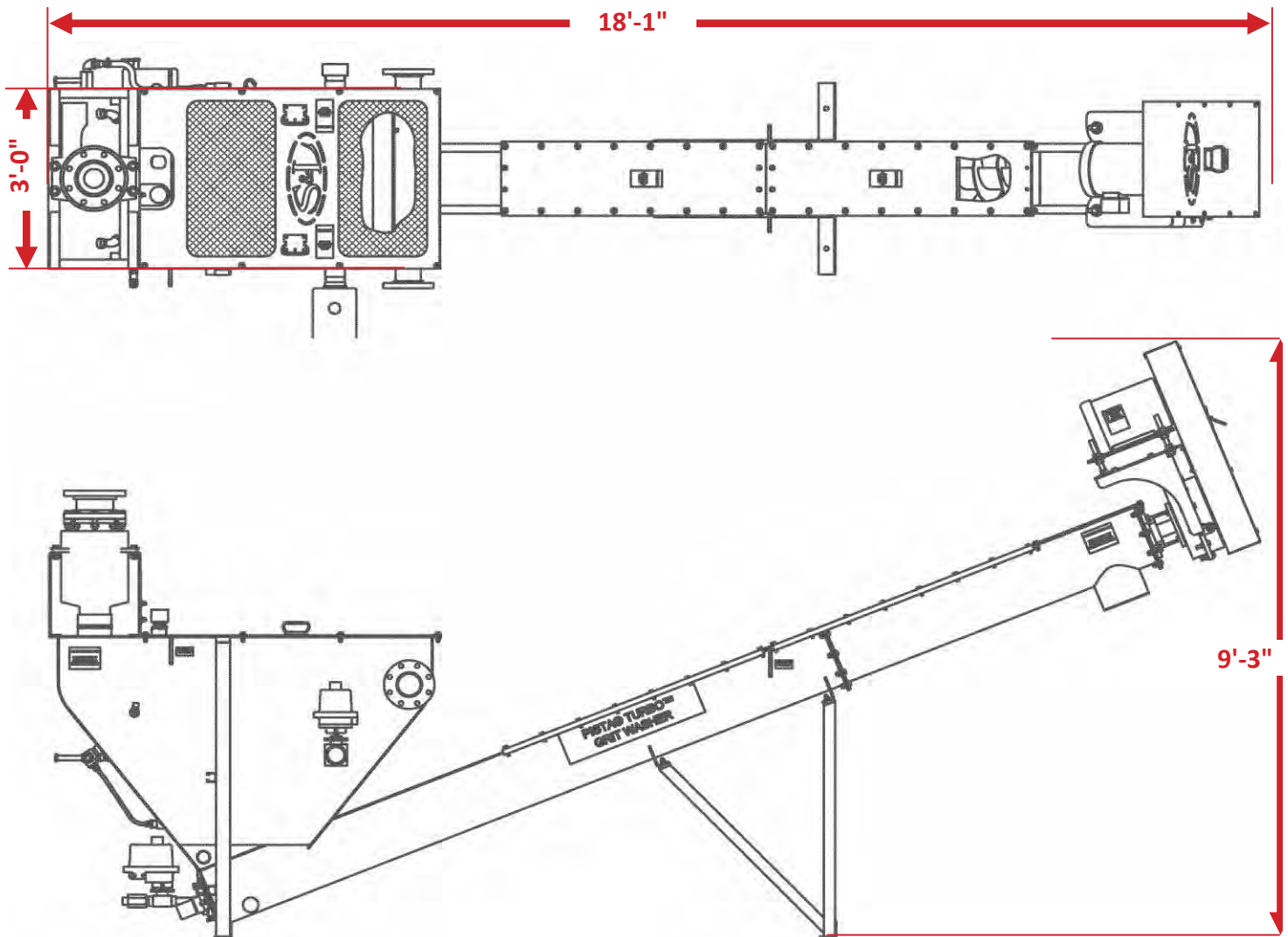


BUDGET PROPOSAL

Model 250 Grit Washer (In lieu of Dewatering Screw Conveyor)

Smith & Loveless offers a grit washer that has the same removal efficiency as our PISTA chamber. It incorporates a number of features to retain the finest and cleanest grit, while still separating organics and water.

- **Less than 5% putrescible organic material in washed grit (typical values are 2.5%)**
- **Less than 10% water content in washed grit (typical values are 3%)**
- Agitation provide by auger no separate mechanism. Air floats off heavier organics.
- Lamella plates in the settling area retain fine grit while still floating off organics
- Screw and trough don't come into contact to highly reduce wear
(wear shoes or liner aren't required or recommended)



BUDGET PROPOSAL

For Earth, For Life



Budgetary Proposal For Millington WWTP Maryland



0.35 MGD Membrane Bioreactor System

August 04, 2022



Prepared By:

Kubota Membrane USA

11807 North Creek Parkway S., Suite B-109

Bothell, WA 98011

425-898-2858

Local Representation By:



Riordan Material Corp.

Tom Rainier

410-440-4411

trainier@riordanmat.com

For Earth, For Life



I am pleased to present the attached materials for your consideration regarding the proposed Kubota membrane bioreactor (MBR) system for the Millington WWTP project. Kubota Membrane USA (KMU) is a company with a strong history in the U.S., backed by Kubota Corporation's extensive wastewater experience worldwide. The Kubota MBR system has unique features that will save your client time through simple and reliable operation.

A compelling feature of the Kubota MBR system is the simplicity of daily operations and periodic maintenance. Both the membrane unit and the MBR system are designed for the operator's convenience. Cleaning is performed in place, with no routine membrane unit removal required. Cleaning events are performed two to four times per year, and each event can be completed in a matter of hours. Also, because the Kubota MBR System uses a flat sheet membrane, it offers straightforward troubleshooting and easy replacement in the unlikely event that problems arise.

Kubota Membrane USA offers first class service. Our technicians have operational experience and are well trained in wastewater analysis and membrane inspection. This sets us apart from other membrane manufacturers who do not design, build, or operate treatment plants, and system integrators who do not manufacture parts or operate plants. We are responsive to operator concerns and knowledgeable about the Kubota MBR System from top to bottom.

With the Kubota name comes a long history of excellence in MBR wastewater treatment. We are happy to put you in touch with operators and engineers who can share their experiences with our product. If you have any questions regarding our proposal, please feel free to contact us or our local representative,

Tom Rainier of Riordan Material Corp., at 410-440-4411 or trainier@riordanmat.com.

Regards,

Kevin Crane
Regional Manager
Kubota Membrane USA Corporation
Cell: 425-381-3604
Email: kevin.crane@kubota.com

Noah Garguilo
Application Engineer
KUBOTA Membrane USA Corporation
425-898-2858 Ext 105
Email: noah.garguilo@kubota.com

Table of Contents

1	Introduction	1
2	Company Background	1
2.1	History	1
2.2	Design Support and After-Sales Service	2
2.3	Kubota's Experience	3
3	Technology Description	4
3.1	Membrane Product Information	4
3.2	MBR Process Description	5
3.3	Operation and Maintenance	6
4	Design Overview	7
4.1	Influent Design Flow	7
4.2	MBR Specifications	8
4.3	Preliminary Layout	8
5	Scope of Supply	10
5.1	Major Equipment and Instrumentation	10
5.2	Direct Services	12
5.3	Exclusions to Kubota Scope of Supply	13
6	Warranty	13
7	Budgetary Price	14
8	24/7 Technical Support	14
9	Additional Services (Optional)	14

Tables

Table 1: Kubota Submerged Membrane Unit Installations Worldwide as of December 2019	3
Table 2: Design Flow Conditions.....	7
Table 3: Influent and Effluent Characteristics	8
Table 4: Membrane Equipment Specifications.....	8
Table 5: Tank Dimensions and Hydraulic Retention Times.....	9
Table 6: Major Equipment and Instrumentation in Kubota's Scope of Supply	10
Table 7: Training and Workshops Included in Kubota's Scope of Supply	12
Table 8: Budgetary Price for Proposed Kubota MBR Equipment and Equipment	14
Table 9: Kubota's Available Services	14

Figures

Figure 1: Progression of the Kubota Membrane	1
Figure 2: Kubota Design Support.....	2
Figure 3: Kubota's Service and Well-Trained Support Team	2
Figure 4: SP600 Series Unit Structure (left) and Module Structure (right)	4
Figure 5: SP Series Module Assembly (left) and Module Connection Detail (right).....	5
Figure 6: Typical CAS Process (top) vs. Kubota MBR Process (bottom)	5
Figure 7: Skid-Mounted Clean-In-Place System.....	6
Figure 8: Chemical Cleaning for Other Manufacturers (left) vs. Kubota Membrane Units (right)	7
Figure 9: Process Flow Schematic	9

1 Introduction

Kubota Membrane USA would like to thank you for the opportunity to present the enclosed budgetary proposal to supply a membrane bioreactor (MBR) system and associated components for the Millington WWTP project. Included below is a brief background of the Kubota Corporation and Kubota's Submerged Membrane Unit. This is followed by a description of the proposed system, along with a scope of supply and budgetary price.

2 Company Background

2.1 History

Kubota Corporation has been designing and building wastewater treatment plants since the early 1960s. Long before building wastewater treatment plants, the company became involved with water engineering projects in 1893 as a manufacturer of iron piping, which was used for clean water distribution. As the largest engineering contractor for wastewater treatment plants in Japan, Kubota has the capability to design, build and operate municipal and industrial wastewater treatment plants.

In the 1980s, Kubota developed its own MBR technology using an external tubular type of ultrafiltration membrane. After the initial installation of these membranes in a soil treatment plant in Japan, Kubota realized these membranes lacked energy efficiency, had short life spans, and required frequent maintenance. This prompted Kubota to find an alternative to the external tubular membranes. In 1989, Kubota pioneered the energy-efficient, long-lasting, and easy-to-use flat sheet membrane with its Submerged Membrane Unit. Kubota's Submerged Membrane Unit was designed specifically for wastewater treatment applications, and is currently installed in wastewater treatment plants around the world, making Kubota a leader in the flat sheet MBR technology market.

The first installation of the Kubota flat sheet Submerged Membrane Unit was for a mechanical tool equipment manufacturer in Hiroshima in 1990. Kubota has refined and improved the membrane product for over 25 years (*Figure 1*). Kubota membranes were first introduced to the U.S. in 2002. Today, MBR systems using the Kubota membrane have been installed all over the world for numerous applications in addition to sewage treatment, such as brewery, dairy, food processing, pharmaceutical and chemical, laundry, leachate, and electrical industry wastes, as well as for sludge liquor treatment and water reuse.

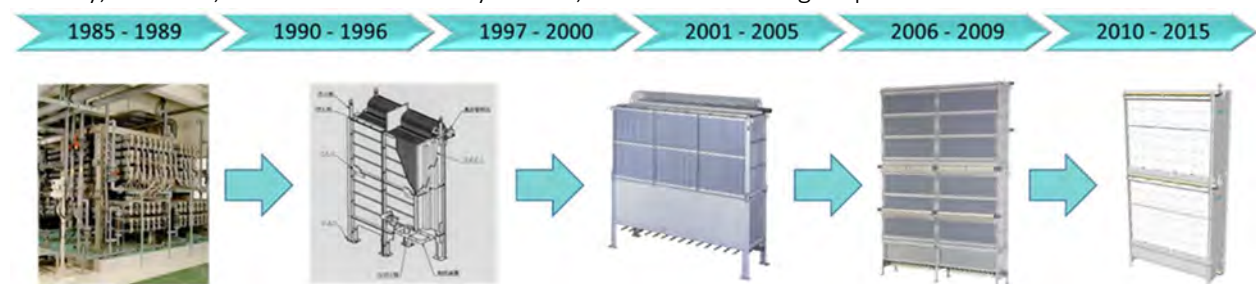


Figure 1: Progression of the Kubota Membrane

2.2 Design Support and After-Sales Service

Kubota Membrane USA has technical staff in Bothell, Washington and Canton, Ohio who can help the customer with any design or operational needs of this project. Kubota staff members are available to provide technical support to consulting engineers, WWTP operators, and WWTP owners. Additionally, Kubota has a Research and Development Center in Canton, OH, which focuses on optimizing the design and performance of Kubota membrane systems for the North American market.

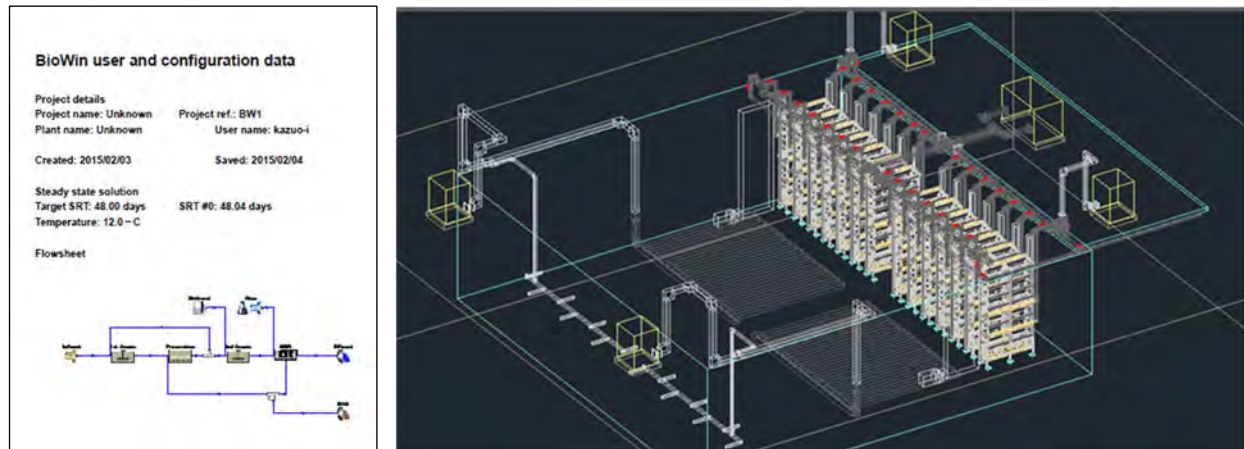


Figure 2: Kubota Design Support

Kubota provides staff on a regular basis for service and support of construction activities and throughout the warranty period. The service provided includes delivery inspection, installation certification, training, commissioning and ongoing technical support. Kubota will also provide operation and maintenance (O&M) manuals and 24/7 customer support.



Figure 3: Kubota's Service and Well-Trained Support Team

2.3 Kubota's Experience

Kubota has extensive experience in all facets of MBR system projects including designing, building, and operating MBR systems. Kubota has executed over 300 Design-Build projects, operates over 30 plants, and has over 150 maintenance contracts. Kubota also designed, operates, and maintains the 80,000 GPD MBR treatment facility for the Kubota Tractor Factory in Georgia, USA.

As of 2019, Kubota MBR systems have been installed at over 6,500 facilities worldwide, making Kubota the top supplier in the world. Even prior to the first U.S. MBR installations, Kubota had already been designing, building, and operating MBR systems around the world for many years.

Table 1: Kubota Submerged Membrane Unit Installations Worldwide as of December 2019

Region	Number of Installations
North America	447
Europe & Africa	677
Middle East	121
Asia (Except Japan) & Oceania	710
Japan	4,593
Total MBR Plants	6,548

3 Technology Description

3.1 Membrane Product Information

For this project, we have prepared a preliminary design based around the SP600 Submerged Membrane Unit (SMU). Kubota's SP series of SMUs offer state-of-the-art technology. The SP series was developed in 2011 to create a Submerged Membrane Unit which is more energy efficient and faster to assemble on-site than the preceding RM/RW series, while still maintaining the reliable and simple operation that is characteristic of Kubota's MBR systems. Kubota's philosophy of learning from our extensive experience is one of our greatest advantages, setting us apart from more newly developed membrane manufacturers. An overview of the structure of the SP series is provided below.

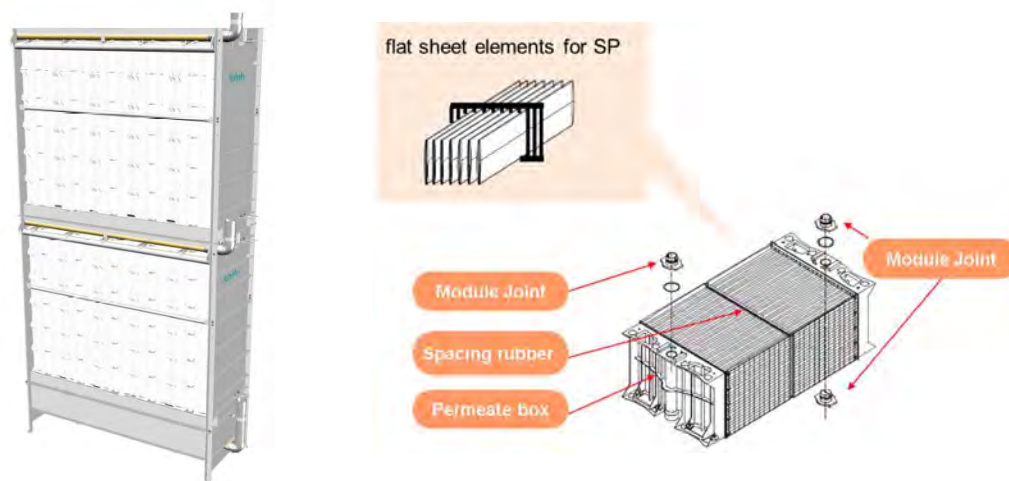


Figure 4: SP600 Series Unit Structure (left) and Module Structure (right)

The cartridge structure of the SP series units differs from previous Kubota products. Forty individual membrane sheets are permanently fixed to each membrane module. Each module has a permeate box and module joint on both ends. These modules are connected in a tubeless configuration by the integrated module joints to form a single cassette. Built-in retainers connect the assembled cassette to a permeate manifold which is connected to the permeate header. The SP series is ideally suited for large installations, offering fast assembly, easy maintenance, and up to 15% lower energy use for air scour in the MBR than other Kubota systems.

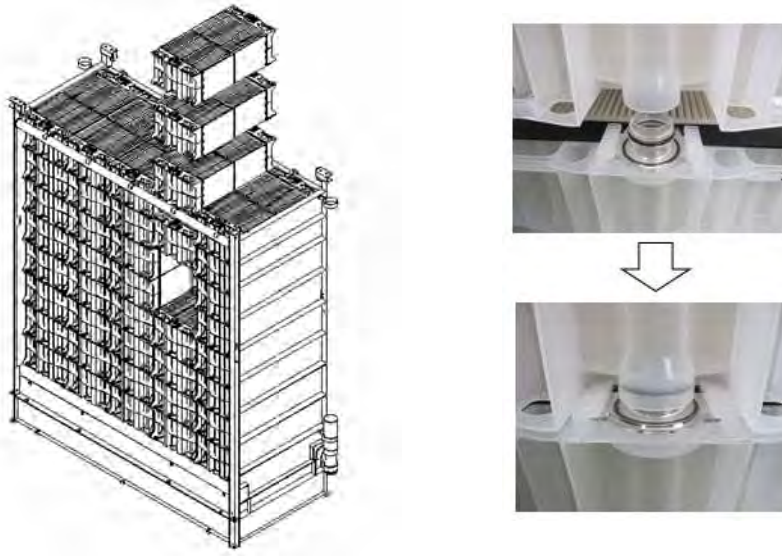


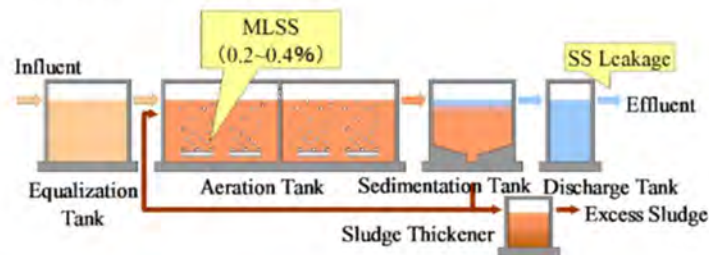
Figure 5: SP Series Module Assembly (left) and Module Connection Detail (right)

Kubota's membrane sheet is made from chlorinated polyethylene, has an average pore size of 0.2 micron (maximum 0.4 micron). This membrane is much thicker than other membranes to provide long-lasting durability and features high porosity to enable high flows. This pore size has been designed as the optimum balance between water quality and quantity and has Title 22 approval for water reuse in California. The SP series utilizes the same membrane material used by Kubota worldwide for over 25 years.

3.2 MBR Process Description

The MBR treatment process is capable of meeting strict nutrient removal requirements while still maintaining a small footprint. Each MBR is the combined process of activated sludge (secondary treatment) and membrane filtration (tertiary treatment). Membrane units are installed in the activated sludge reactor,

Conventional Activated Sludge (CAS)



Kubota MBR

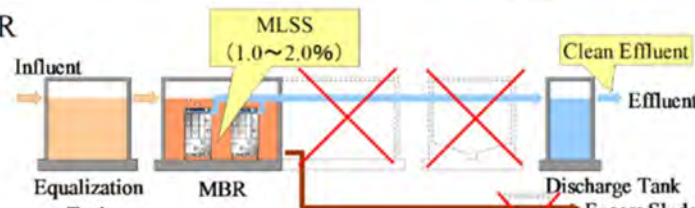


Figure 6: Typical CAS Process (top) vs. Kubota MBR Process (bottom)

where sludge and treated water are separated by means of physical filtration. Other treatment processes, such as conventional activated sludge, require gravity sedimentation through the use of final clarifiers. MBRs eliminate the need for gravity sedimentation, thereby eliminating the need for final clarifiers.

Additionally, the Kubota SP series can operate at mixed liquor concentrations ranging from 5,000 mg/L to 13,000 mg/L, which is much higher than that of a conventional activated sludge basin or that of hollow fiber MBR systems. This not only reduces the required aeration volume and the volume of waste sludge produced, but also gives the system increased ability to withstand influent load fluctuations.

The Kubota MBR tank works as both a solid-liquid separation tank and an aeration tank to support the biological process. Because of Kubota's stable air scour and infrequent in-situ chemical cleaning, aeration from the air scour can be considered as oxygen supply for biological treatment. This helps to reduce the oxygen requirement in the aeration tank and thus helps decrease the total operational energy cost of the treatment process.

3.3 Operation and Maintenance

Simplicity is a core tenet of the Kubota MBR system. The Kubota MBR system offers a simple design, simple operation, and simple maintenance. The primary method of membrane cleaning for the Kubota MBR system is the air scour provided by the diffusers at the base of the membrane units. The chemical cleaning system is extremely simple and eliminates the need for separate tanks or tank linings for immersive cleaning. The system consists of a venturi injector which feeds the cleaning solution through the permeate piping using municipal utility water. The venturi system can be skid-mounted on a wall, as shown in the figure below.

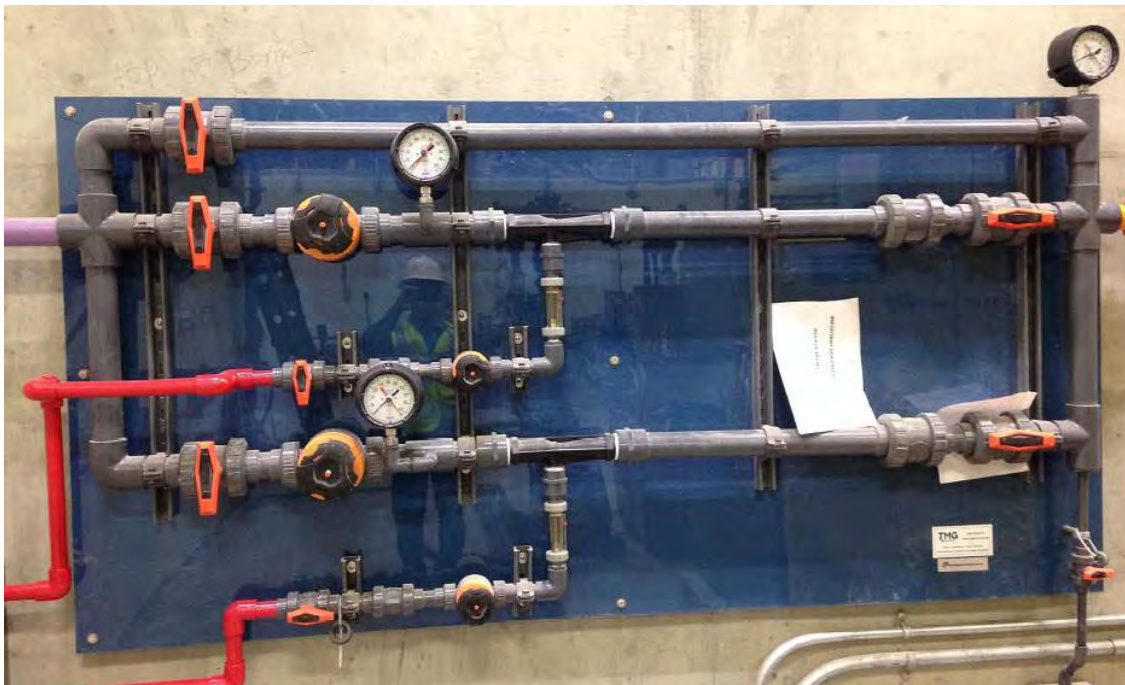


Figure 7: Skid-Mounted Clean-In-Place System

There is no need to drain the tanks or remove the membrane units to perform chemical cleaning. All that is required is stopping the operation, opening a vent, injecting a chemical solution, and allowing that solution to soak in the membrane units for 2 to 4 hours.

Organic fouling can be cleaned with a 0.5% sodium hypochlorite (NaClO) solution. This is typically done two to four times per year. Inorganic fouling such as iron or aluminum can be cleaned by a 1% oxalic or citric acid solution and is typically needed once a year or less. If the residual chemical cannot be discharged from the system, it can be sent back to the raw water inlet or to the bioreactor in order to neutralize the chemical.

This simple and infrequent maintenance cleaning is the only chemical cleaning required; no recovery cleaning is necessary for operation of the Kubota MBR system. Moreover, the Kubota MBR system does not use the backpulse cleaning that is frequently used in hollow fiber MBR systems. This helps reduce the energy requirements and simplifies the piping and operation of the Kubota MBR system when compared with hollow fiber systems.

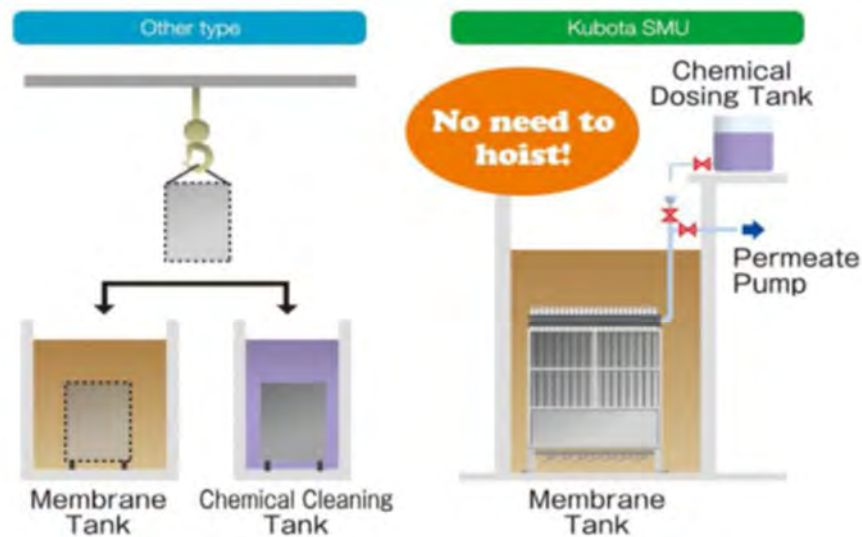


Figure 8: Chemical Cleaning for Other Manufacturers (left) vs. Kubota Membrane Units (right)

4 Design Overview

The MBR system was designed based on the following influent flow data (Tables 2 and 3).

4.1 Influent Design Flow

The flow conditions used for the preliminary design are shown in the table below.

Table 2: Design Flow Conditions

Condition	Flow	Unit
Average Day Flow	0.35	MGD
Max Month Flow	0.7	MGD
Peak Day Flow	1.0	MGD
Peak Hour Flow	1.3	MGD

The wastewater characteristics used for preliminary design were provided to KMU and are listed in the table below.

Table 3: Influent and Effluent Characteristics

Constituent	Max Month Influent Concentration	Required Effluent Concentration
BOD	300 mg/L	<10 mg/L
TSS	225 mg/L	<10 mg/l
TKN	40 mg/L	--
TN	--	<3 mg/L
TP	8 mg/L	<0.3 mg/L

4.2 MBR Specifications

The proposed MBR system was designed with the capacity of treating the Max Month Flow for up to 3 months and the Peak Day Flow for up to 24 hours.

Table 4: Membrane Equipment Specifications

Component	MBR Specifications
Membrane Model	SP600
Membrane Surface Area per Unit	6,456ft ²
Design MLSS at MBR	12,000 mg/L
Number of Treatment Trains	2 Trains
Number of Membrane Tanks	3 Tanks
Total Number of Submerged Membrane Units	9 units (3 units per tank)
Minimum Wastewater Temperature	12°C
Maximum Wastewater Temperature	25°C (assumed)

4.3 Preliminary Layout

KMU is proposing a four-stage Bardenpho process flow for the system in order to achieve an effluent total nitrogen concentration of 3 mg/l. The proposed MBR system includes 2 biological treatment trains each with a pre-anoxic tank, aeration tank, post-anoxic tank, and 3 MBR tanks in parallel. A common MBR feed channel will be used to distribute flow between the MBR tanks. A common Return Activated Sludge (RAS) channel will be used after the MBR. The basic process flow diagram is shown below.

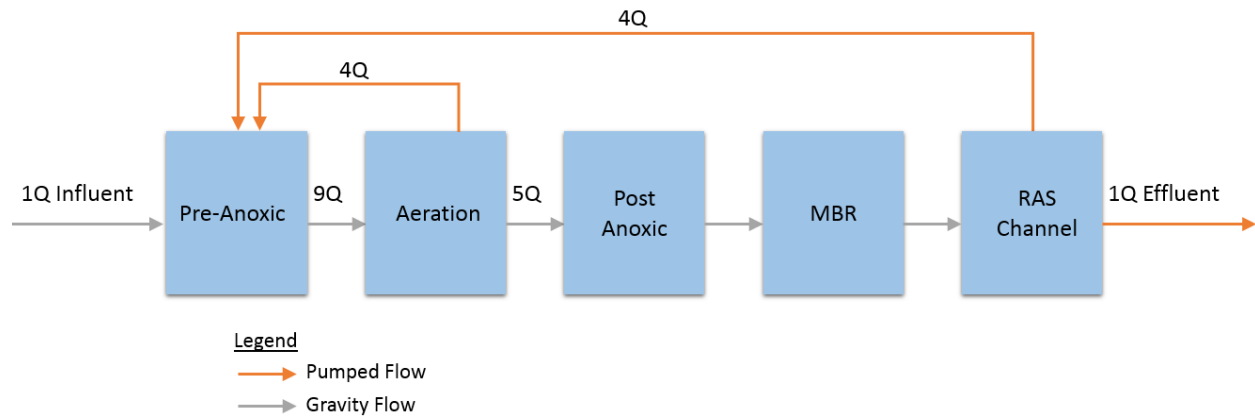


Figure 9: Process Flow Schematic

Preliminary tank sizing was performed using Kubota standard design parameters. Sizing was based on the minimum temperature, and the maximum monthly flow and loading. A summary of the preliminary tank sizes is included below.

Table 5: Tank Dimensions and Hydraulic Retention Times

Tank Name	Appx. Dimensions (L' x W')	SWD (feet)	Tank Vol. (gallons)	Number of Tanks	Total Volume (gallons)	HRT at MMF (hours)
Pre-Anoxic	4.5' x 16.5'	16.6'	9,000 gal	2	18,000 gal	0.7 hours
Aeration	16' x 16.5'	16.1'	31,500 gal	2	63,000 gal	2.5 hours
Post-Anoxic	5' x 16.5'	15.6'	9,500 gal	2	19,000 gal	0.8 hours
MBR	13.5' x 10.5	15.1'	16,000 gal	3	48,000 gal	1.9 hours
RAS Channel	37' x 5'	Varies	Varies	1	Varies	Varies
TOTAL	-	-	-	-	148,000 gal	5.9 hours

External carbon is dosed to the Post-Anoxic tank in order to further reduce nitrate (approximate dosing rate of 1.4 gallons per day of MicroC 2000 product).

5 Scope of Supply

The following proposed items will be supplied by Kubota Membrane USA and are included in the budgetary prices that are listed in Section 7. We are flexible in terms of scope of supply though, and are happy to adjust our scope to fit the project's needs.

5.1 Major Equipment and Instrumentation

Table 6: Major Equipment and Instrumentation in Kubota's Scope of Supply

Name	Type	Anticipated Size	HP	Quantity
Pre-Anoxic Zone Equipment				
Pre-Anoxic Mixer	Submersible	9,000 gallons	0.7	2
Aeration Zone Equipment				
Pre-Aeration Diffuser	Fine Bubble	208 scfm	--	2 sets
Pre-Aeration Blower	Positive Displacement	208 scfm 10 psig	15	2 duty (MBR is a common spare)
Air Flow Meter	Mass Air Flow, Insertion Style	6 inch	--	2
DO Meter	LDO Probe and Transmitter	--	--	2
Internal Recycle Pump	Submersible	417 gpm	2	2 duty + 2 standby
Internal Recycle Pump Flow Meter	Electromagnetic	6 inch	--	2
Level Transmitter	Diaphragm	--	--	2
Post-Anoxic Zone Equipment				
Post-Anoxic Mixer	Submersible	9,500 gallons	0.7	2
Membrane Zone Equipment				
Submerged Membrane Unit	Flat Plate	SP600	--	9
SMU Guide and Stabilizer	-	-	--	9 sets
MBR Blower	Positive Displacement	341scfm 8.7psig	0	3 duty + 1 standby
Air Flow Meter	Mass Air Flow, Insertion Style	--	--	3
Level Switch	Float	--	--	3 LL
Permeate Equipment				
Permeate Pump	Self-Priming Centrifugal	228 gpm	5	3 duty + 1 standby

Name	Type	Anticipated Size	HP	Quantity
Permeate Flow Meter	Electromagnetic	4 inch	--	3
Permeate Flow Control Valve	Modulating Butterfly Valve	4 inch	--	3
Permeate Turbidity Meter	Laser Meter and Transmitter	--	--	3
Permeate Pressure Transmitter	Diaphragm	--	--	3
RAS Channel Equipment				
RAS Pump	Submersible	414 gpm	5	2 duty + 1 standby
RAS Flow Meter	Electromagnetic	6 inch	--	2
Level Switch	Float	--	--	2 (HL + LL)
Level Transmitter	Diaphragm	--	--	1
WAS Pump	Submersible	30 gpm	0.5	1 duty + 1 standby
WAS Pump Flow Meter	Electromagnetic	2 inch	--	1
Other Equipment				
In-Basin Permeate Piping, Excluding Headers	Schedule 80 PVC w/ isolation valve	3-inch	--	18 sets
In-Basin Air Scour Drop Piping, Excluding Headers	304 Stainless Steel w/ CI isolation valve	3-inch	--	18 sets
CIP System	Chemical Injection System	--	--	1
Alum injection system	Peristaltic pumps, calibration column, injection quill	--	--	2 sets
MBR Control Panel, HMI	MBR Control Panel	--	--	1

5.2 Direct Services

The following services are included in Kubota's scope of supply:

Design Support

- Support during preliminary and final design.
- Construction submittals including shop drawings.
- Preparation and submittal of a system O&M manual for Kubota supplied systems and equipment.
- Equipment delivery coordination with the contractor.

Commissioning

- 15 days on-site for start-up and commissioning including dry and wet equipment checks, clean water testing, and support during seeding and start-up.
- 5 days on-site for performance testing.
- Additional days are available as needed.

Training

- 3 days of on-site, hands on operator training using a mix of classroom and field time. See Table 7 below for list of training topics.

Table 7: Training and Workshops Included in Kubota's Scope of Supply

Training/Workshop	Brief Summary
MBR HMI	1. Navigation of all HMI screens and menus. 2. Review of automatic operations and controls. 3. Changing process set points. 4. Overriding controls from the HMI. 5. Manual operation of the system in the event of a power failure.
CIP training	1. Navigation of CIP (Clean-In-Place), in-situ maintenance chemical cleaning. 2. Control from HMI and operation of manual valve. 3. Adjust set points of chemical flow.
Troubleshooting	1. Case study of troubleshooting 2. Recovery from trouble 3. "Fish bone" approach
Daily testing	1. Filterability test 2. Viscosity measurement

Workshop/Additional Training Available (No Charge)

- In addition to our standard training at commissioning, Kubota Membrane USA will host an annual operator workshop in which operators meet to exchange ideas and learn about the latest developments in MBR technology.
- Customized individual training, such as membrane disassembling training, is also available upon request.

Remote Monitoring Available (No Charge for First Year)

○ *Support by Remote Monitoring*

The Kubota membrane system as proposed includes an MBR HMI system that can be remotely monitored and controlled, provided wireless connectivity is available. Technical support staff can monitor the status of your system to proactively address potential problems. Whenever a call is placed to our service staff, that person will be able to log in to the MBR HMI system and easily see what is happening at the plant.

5.3 Exclusions to Kubota Scope of Supply

The following items are not currently included in the Kubota scope of supply:

- Performance and payment bond costs.
- Equipment installation.
- Pretreatment/headworks including coarse screen, fine screen, and grit removal.
 - ✓ Kubota recommends an internally-fed drum screen with perforated openings less than 2-mm, or similar. KMU can provide screens as part of the Scope of Supply at an additional cost.
- Overhead walkways and In-basin structural supports for the Submerged Membrane Units
 - ✓ KMU will provide SMU guide sets as shown in the scope of supply. Guide sets will require a support structure along the top of the tank.
- Seismic bracing for equipment.
 - ✓ KMU can perform the design of seismic bracing and supply bracing for an additional cost.
- Solids handling equipment and digestors.
- Permeate disinfection systems.
- Electrical system including primary and backup power, lighting, HVAC, etc.
- Variable frequency drives (VFDs) and motor controllers.
- Construction of concrete tanks, buildings, and structures.
- MBR air scour and permeate header pipes, and all other piping that is outside of the MBR tanks.
- Civil works including installation, connection of piping, installation of wiring for all Kubota supplied equipment and instrumentation.
- Equipment access platforms, walkways, ladders, or stairs.
- Equipment lifts or hoists.
- Heat tracing materials if needed.

6 Warranty

Equipment Warranty

Kubota's standard 2-year membrane warranty, and 1-year mechanical equipment warranty is included in the main budgetary price proposed (Table 8) and goes into effect at the commencement date of commissioning. The warranty included is a guarantee that the products supplied by Kubota are free from defect in material or workmanship.

7 Budgetary Price

The estimated budgetary price for the equipment and instrumentation described herein is shown below in Table 8. The pricing herein is for budgetary purposes only and does not constitute an offer of sale. Freight, taxes or duties are not included.

Table 8: Budgetary Price for Proposed Kubota MBR Equipment and Equipment

Budgetary Price – MBR Equipment, Instrumentation, and Services	
Budgetary Price	\$1,275,000

8 24/7 Technical Support

24/7 phone support is available in addition to support during regular business hours. 24-hour technical support calls are shared within the Kubota staff so that you can rest assured knowing that knowledgeable engineers and technicians are just a phone call away.

9 Additional Services (Optional)

The following service plans are optional and may be added to Kubota's scope of supply if desired for an additional cost.

Kubota Custom Membrane Support Plan

Kubota can customize your support/service package to meet your needs. The following table shows a variety of our available services:

Table 9: Kubota's Available Services

Service	Note
Periodical technical support	Monthly, Quarterly, Annually
24/7 phone support	
MBR HMI monitoring	Weekly, Monthly, Quarterly
Periodical site visit	Quarterly, Semi-annually, Annually
Membrane inspection	Annual, Semi-annual, 3x per year
Program (HMI, etc.) update	Based on hydraulic changes, such as increases in flow or changes in operation.

For Earth, For Life



Budgetary Proposal For Millington WWTP Maryland



0.60 MGD Membrane Bioreactor System

August 04, 2022



Prepared By:

Kubota Membrane USA

11807 North Creek Parkway S., Suite B-109

Bothell, WA 98011

425-898-2858

Local Representation By:



Riordan Material Corp.

Tom Rainier

410-440-4411

trainier@riordanmat.com

For Earth, For Life



I am pleased to present the attached materials for your consideration regarding the proposed Kubota membrane bioreactor (MBR) system for the Millington WWTP project. Kubota Membrane USA (KMU) is a company with a strong history in the U.S., backed by Kubota Corporation's extensive wastewater experience worldwide. The Kubota MBR system has unique features that will save your client time through simple and reliable operation.

A compelling feature of the Kubota MBR system is the simplicity of daily operations and periodic maintenance. Both the membrane unit and the MBR system are designed for the operator's convenience. Cleaning is performed in place, with no routine membrane unit removal required. Cleaning events are performed two to four times per year, and each event can be completed in a matter of hours. Also, because the Kubota MBR System uses a flat sheet membrane, it offers straightforward troubleshooting and easy replacement in the unlikely event that problems arise.

Kubota Membrane USA offers first class service. Our technicians have operational experience and are well trained in wastewater analysis and membrane inspection. This sets us apart from other membrane manufacturers who do not design, build, or operate treatment plants, and system integrators who do not manufacture parts or operate plants. We are responsive to operator concerns and knowledgeable about the Kubota MBR System from top to bottom.

With the Kubota name comes a long history of excellence in MBR wastewater treatment. We are happy to put you in touch with operators and engineers who can share their experiences with our product. If you have any questions regarding our proposal, please feel free to contact us or our local representative,

Tom Rainier of Riordan Material Corp., at 410-440-4411 or trainier@riordanmat.com.

Regards,

Kevin Crane
Regional Manager
Kubota Membrane USA Corporation
Cell: 425-381-3604
Email: kevin.crane@kubota.com

Noah Garguilo
Application Engineer
KUBOTA Membrane USA Corporation
425-898-2858 Ext 105
Email: noah.garguilo@kubota.com

Table of Contents

1	Introduction	1
2	Company Background	1
2.1	History	1
2.2	Design Support and After-Sales Service	2
2.3	Kubota's Experience	3
3	Technology Description	4
3.1	Membrane Product Information	4
3.2	MBR Process Description	5
3.3	Operation and Maintenance	6
4	Design Overview	7
4.1	Influent Design Flow	7
4.2	MBR Specifications	8
4.3	Preliminary Layout	8
5	Scope of Supply	10
5.1	Major Equipment and Instrumentation	10
5.2	Direct Services	12
5.3	Exclusions to Kubota Scope of Supply	13
6	Warranty	13
7	Budgetary Price	14
8	24/7 Technical Support	14
9	Additional Services (Optional)	14

Tables

Table 1: Kubota Submerged Membrane Unit Installations Worldwide as of December 2019	3
Table 2: Design Flow Conditions.....	7
Table 3: Influent and Effluent Characteristics	8
Table 4: Membrane Equipment Specifications.....	8
Table 5: Tank Dimensions and Hydraulic Retention Times.....	9
Table 6: Major Equipment and Instrumentation in Kubota's Scope of Supply	10
Table 7: Training and Workshops Included in Kubota's Scope of Supply	12
Table 8: Budgetary Price for Proposed Kubota MBR Equipment and Equipment	14
Table 9: Kubota's Available Services	14

Figures

Figure 1: Progression of the Kubota Membrane	1
Figure 2: Kubota Design Support.....	2
Figure 3: Kubota's Service and Well-Trained Support Team	2
Figure 4: SP600 Series Unit Structure (left) and Module Structure (right)	4
Figure 5: SP Series Module Assembly (left) and Module Connection Detail (right).....	5
Figure 6: Typical CAS Process (top) vs. Kubota MBR Process (bottom)	5
Figure 7: Skid-Mounted Clean-In-Place System.....	6
Figure 8: Chemical Cleaning for Other Manufacturers (left) vs. Kubota Membrane Units (right)	7
Figure 9: Process Flow Schematic	9

1 Introduction

Kubota Membrane USA would like to thank you for the opportunity to present the enclosed budgetary proposal to supply a membrane bioreactor (MBR) system and associated components for the Millington WWTP project. Included below is a brief background of the Kubota Corporation and Kubota's Submerged Membrane Unit. This is followed by a description of the proposed system, along with a scope of supply and budgetary price.

2 Company Background

2.1 History

Kubota Corporation has been designing and building wastewater treatment plants since the early 1960s. Long before building wastewater treatment plants, the company became involved with water engineering projects in 1893 as a manufacturer of iron piping, which was used for clean water distribution. As the largest engineering contractor for wastewater treatment plants in Japan, Kubota has the capability to design, build and operate municipal and industrial wastewater treatment plants.

In the 1980s, Kubota developed its own MBR technology using an external tubular type of ultrafiltration membrane. After the initial installation of these membranes in a soil treatment plant in Japan, Kubota realized these membranes lacked energy efficiency, had short life spans, and required frequent maintenance. This prompted Kubota to find an alternative to the external tubular membranes. In 1989, Kubota pioneered the energy-efficient, long-lasting, and easy-to-use flat sheet membrane with its Submerged Membrane Unit. Kubota's Submerged Membrane Unit was designed specifically for wastewater treatment applications, and is currently installed in wastewater treatment plants around the world, making Kubota a leader in the flat sheet MBR technology market.

The first installation of the Kubota flat sheet Submerged Membrane Unit was for a mechanical tool equipment manufacturer in Hiroshima in 1990. Kubota has refined and improved the membrane product for over 25 years (*Figure 1*). Kubota membranes were first introduced to the U.S. in 2002. Today, MBR systems using the Kubota membrane have been installed all over the world for numerous applications in addition to sewage treatment, such as brewery, dairy, food processing, pharmaceutical and chemical, laundry, leachate, and electrical industry wastes, as well as for sludge liquor treatment and water reuse.

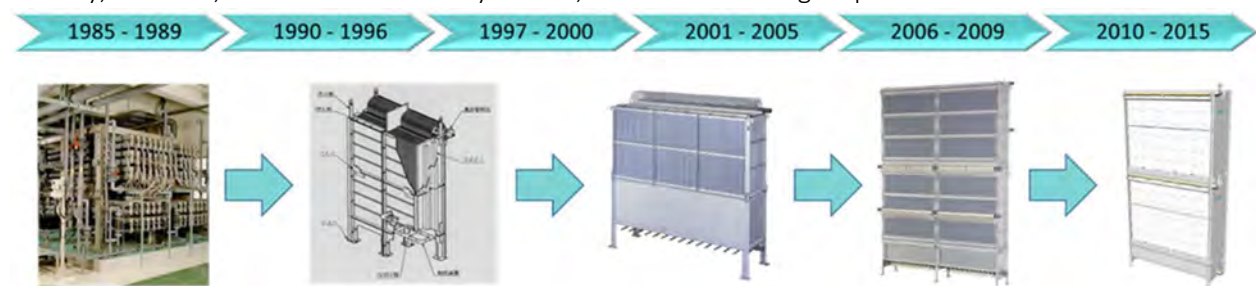


Figure 1: Progression of the Kubota Membrane

2.2 Design Support and After-Sales Service

Kubota Membrane USA has technical staff in Bothell, Washington and Canton, Ohio who can help the customer with any design or operational needs of this project. Kubota staff members are available to provide technical support to consulting engineers, WWTP operators, and WWTP owners. Additionally, Kubota has a Research and Development Center in Canton, OH, which focuses on optimizing the design and performance of Kubota membrane systems for the North American market.

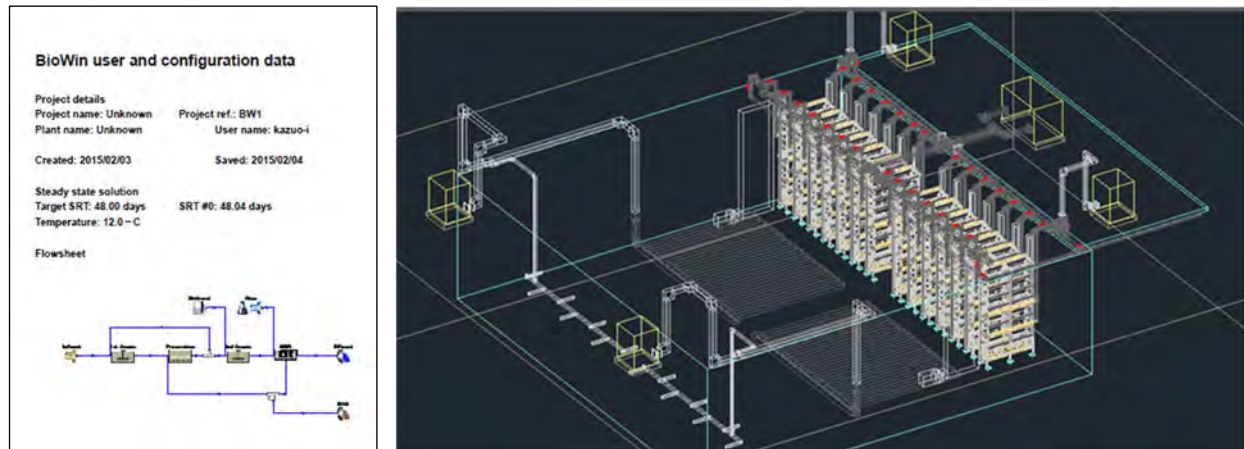


Figure 2: Kubota Design Support

Kubota provides staff on a regular basis for service and support of construction activities and throughout the warranty period. The service provided includes delivery inspection, installation certification, training, commissioning and ongoing technical support. Kubota will also provide operation and maintenance (O&M) manuals and 24/7 customer support.



Figure 3: Kubota's Service and Well-Trained Support Team

2.3 Kubota's Experience

Kubota has extensive experience in all facets of MBR system projects including designing, building, and operating MBR systems. Kubota has executed over 300 Design-Build projects, operates over 30 plants, and has over 150 maintenance contracts. Kubota also designed, operates, and maintains the 80,000 GPD MBR treatment facility for the Kubota Tractor Factory in Georgia, USA.

As of 2019, Kubota MBR systems have been installed at over 6,500 facilities worldwide, making Kubota the top supplier in the world. Even prior to the first U.S. MBR installations, Kubota had already been designing, building, and operating MBR systems around the world for many years.

Table 1: Kubota Submerged Membrane Unit Installations Worldwide as of December 2019

Region	Number of Installations
North America	447
Europe & Africa	677
Middle East	121
Asia (Except Japan) & Oceania	710
Japan	4,593
Total MBR Plants	6,548

3 Technology Description

3.1 Membrane Product Information

For this project, we have prepared a preliminary design based around the SP600 Submerged Membrane Unit (SMU). Kubota's SP series of SMUs offer state-of-the-art technology. The SP series was developed in 2011 to create a Submerged Membrane Unit which is more energy efficient and faster to assemble on-site than the preceding RM/RW series, while still maintaining the reliable and simple operation that is characteristic of Kubota's MBR systems. Kubota's philosophy of learning from our extensive experience is one of our greatest advantages, setting us apart from more newly developed membrane manufacturers. An overview of the structure of the SP series is provided below.

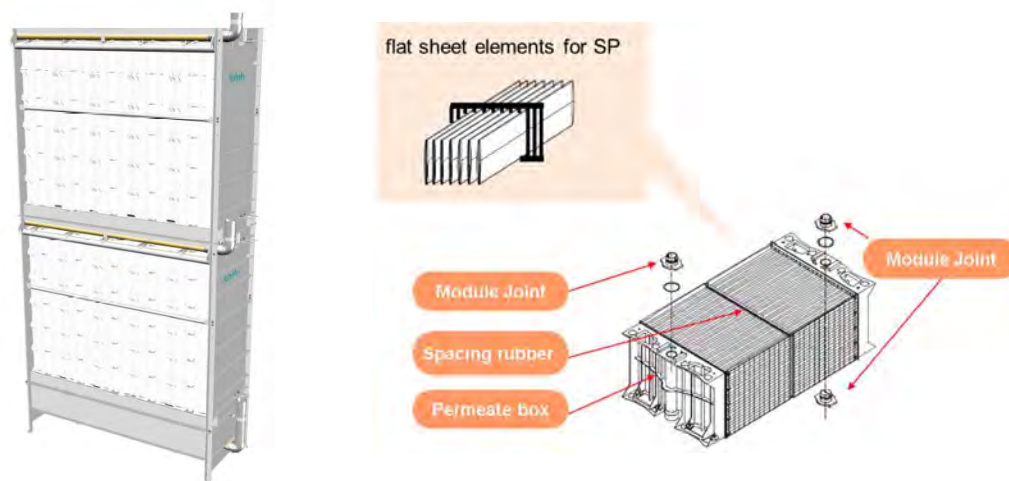


Figure 4: SP600 Series Unit Structure (left) and Module Structure (right)

The cartridge structure of the SP series units differs from previous Kubota products. Forty individual membrane sheets are permanently fixed to each membrane module. Each module has a permeate box and module joint on both ends. These modules are connected in a tubeless configuration by the integrated module joints to form a single cassette. Built-in retainers connect the assembled cassette to a permeate manifold which is connected to the permeate header. The SP series is ideally suited for large installations, offering fast assembly, easy maintenance, and up to 15% lower energy use for air scour in the MBR than other Kubota systems.

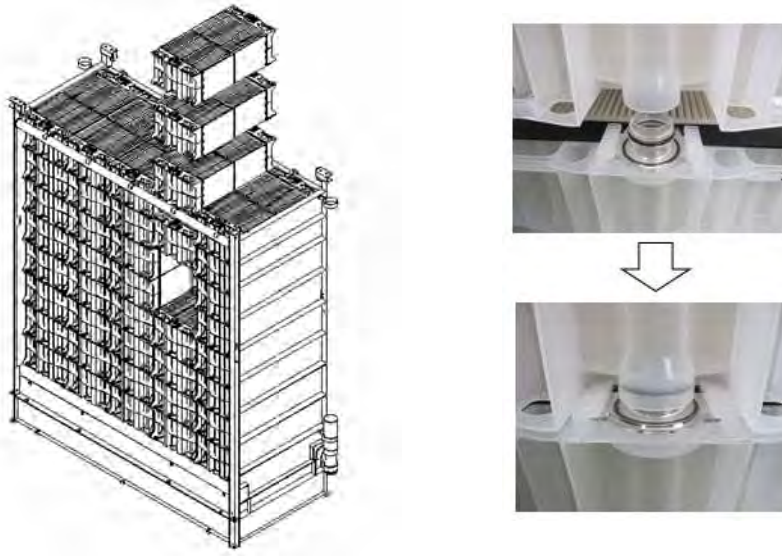


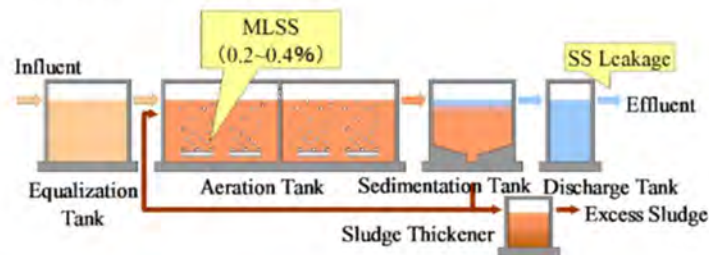
Figure 5: SP Series Module Assembly (left) and Module Connection Detail (right)

Kubota's membrane sheet is made from chlorinated polyethylene, has an average pore size of 0.2 micron (maximum 0.4 micron). This membrane is much thicker than other membranes to provide long-lasting durability and features high porosity to enable high flows. This pore size has been designed as the optimum balance between water quality and quantity and has Title 22 approval for water reuse in California. The SP series utilizes the same membrane material used by Kubota worldwide for over 25 years.

3.2 MBR Process Description

The MBR treatment process is capable of meeting strict nutrient removal requirements while still maintaining a small footprint. Each MBR is the combined process of activated sludge (secondary treatment) and membrane filtration (tertiary treatment). Membrane units are installed in the activated sludge reactor,

Conventional Activated Sludge (CAS)



Kubota MBR

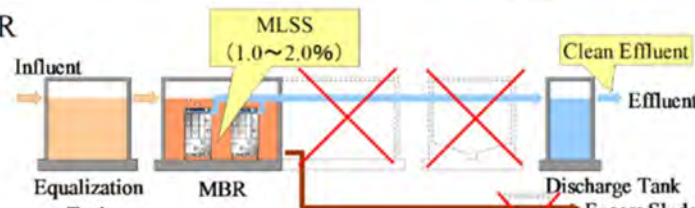


Figure 6: Typical CAS Process (top) vs. Kubota MBR Process (bottom)

where sludge and treated water are separated by means of physical filtration. Other treatment processes, such as conventional activated sludge, require gravity sedimentation through the use of final clarifiers. MBRs eliminate the need for gravity sedimentation, thereby eliminating the need for final clarifiers.

Additionally, the Kubota SP series can operate at mixed liquor concentrations ranging from 5,000 mg/L to 13,000 mg/L, which is much higher than that of a conventional activated sludge basin or that of hollow fiber MBR systems. This not only reduces the required aeration volume and the volume of waste sludge produced, but also gives the system increased ability to withstand influent load fluctuations.

The Kubota MBR tank works as both a solid-liquid separation tank and an aeration tank to support the biological process. Because of Kubota's stable air scour and infrequent in-situ chemical cleaning, aeration from the air scour can be considered as oxygen supply for biological treatment. This helps to reduce the oxygen requirement in the aeration tank and thus helps decrease the total operational energy cost of the treatment process.

3.3 Operation and Maintenance

Simplicity is a core tenet of the Kubota MBR system. The Kubota MBR system offers a simple design, simple operation, and simple maintenance. The primary method of membrane cleaning for the Kubota MBR system is the air scour provided by the diffusers at the base of the membrane units. The chemical cleaning system is extremely simple and eliminates the need for separate tanks or tank linings for immersive cleaning. The system consists of a venturi injector which feeds the cleaning solution through the permeate piping using municipal utility water. The venturi system can be skid-mounted on a wall, as shown in the figure below.

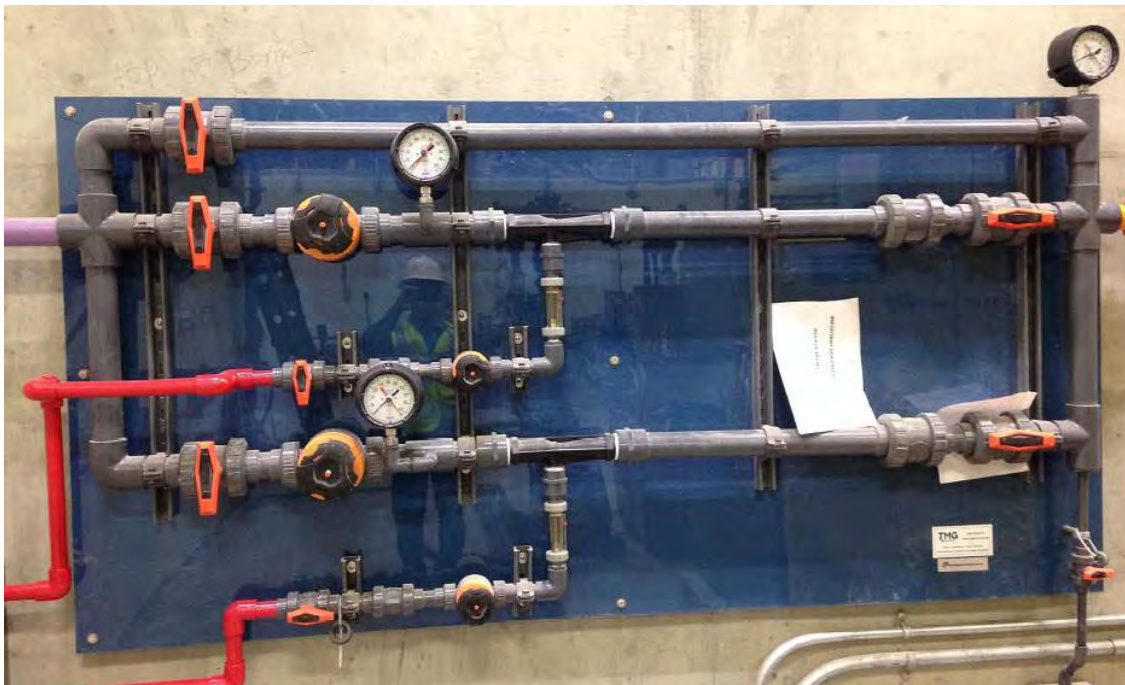


Figure 7: Skid-Mounted Clean-In-Place System

There is no need to drain the tanks or remove the membrane units to perform chemical cleaning. All that is required is stopping the operation, opening a vent, injecting a chemical solution, and allowing that solution to soak in the membrane units for 2 to 4 hours.

Organic fouling can be cleaned with a 0.5% sodium hypochlorite (NaClO) solution. This is typically done two to four times per year. Inorganic fouling such as iron or aluminum can be cleaned by a 1% oxalic or citric acid solution and is typically needed once a year or less. If the residual chemical cannot be discharged from the system, it can be sent back to the raw water inlet or to the bioreactor in order to neutralize the chemical.

This simple and infrequent maintenance cleaning is the only chemical cleaning required; no recovery cleaning is necessary for operation of the Kubota MBR system. Moreover, the Kubota MBR system does not use the backpulse cleaning that is frequently used in hollow fiber MBR systems. This helps reduce the energy requirements and simplifies the piping and operation of the Kubota MBR system when compared with hollow fiber systems.

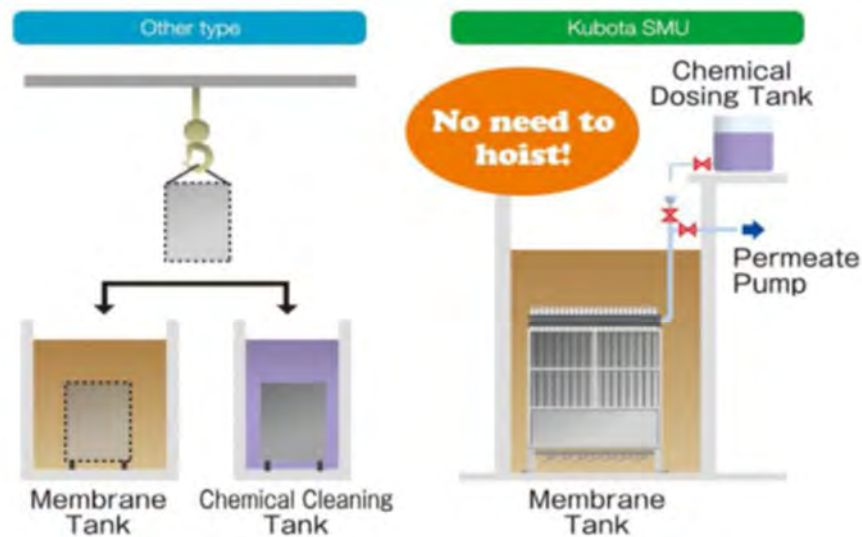


Figure 8: Chemical Cleaning for Other Manufacturers (left) vs. Kubota Membrane Units (right)

4 Design Overview

The MBR system was designed based on the following influent flow data (Tables 2 and 3).

4.1 Influent Design Flow

The flow conditions used for the preliminary design are shown in the table below.

Table 2: Design Flow Conditions

Condition	Flow	Unit
Average Day Flow	0.6	MGD
Max Month Flow	1.1	MGD
Peak Day Flow	1.6	MGD
Peak Hour Flow	2.1	MGD

The wastewater characteristics used for preliminary design were provided to KMU and are listed in the table below.

Table 3: Influent and Effluent Characteristics

Constituent	Max Month Influent Concentration	Required Effluent Concentration
BOD	300 mg/L	<10 mg/L
TSS	225 mg/L	<10 mg/l
TKN	40 mg/L	--
TN	--	<3 mg/L
TP	8 mg/L	<0.3 mg/L

4.2 MBR Specifications

The proposed MBR system was designed with the capacity of treating the Max Month Flow for up to 3 months and the Peak Day Flow for up to 24 hours.

Table 4: Membrane Equipment Specifications

Component	MBR Specifications
Membrane Model	SP600
Membrane Surface Area per Unit	6,456ft ²
Design MLSS at MBR	12,100 mg/L
Number of Treatment Trains	2 Trains
Number of Membrane Tanks	3 Tanks
Total Number of Submerged Membrane Units	15 units (5 units per tank)
Minimum Wastewater Temperature	12°C
Maximum Wastewater Temperature	25°C (assumed)

4.3 Preliminary Layout

KMU is proposing a four-stage Bardenpho process flow for the system in order to achieve an effluent total nitrogen concentration of 3 mg/l. The proposed MBR system includes 2 biological treatment trains each with a pre-anoxic tank, aeration tank, post-anoxic tank, and 3 MBR tanks in parallel. A common MBR feed channel will be used to distribute flow between the MBR tanks. A common Return Activated Sludge (RAS) channel will be used after the MBR. The basic process flow diagram is shown below.

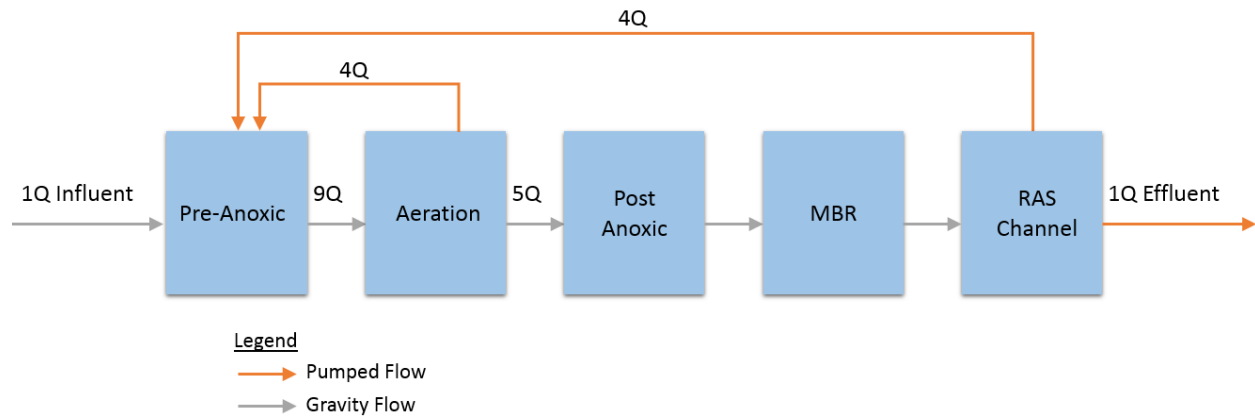


Figure 9: Process Flow Schematic

Preliminary tank sizing was performed using Kubota standard design parameters. Sizing was based on the minimum temperature, and the maximum monthly flow and loading. A summary of the preliminary tank sizes is included below.

Table 5: Tank Dimensions and Hydraulic Retention Times

Tank Name	Appx. Dimensions (L' x W')	SWD (feet)	Tank Vol. (gallons)	Number of Tanks	Total Volume (gallons)	HRT at MMF (hours)
Pre-Anoxic	8.5' x 19'	16.6'	19,000 gal	2	38,000 gal	0.8 hours
Aeration	30' x 19'	16.1'	67,500 gal	2	135,000 gal	2.9 hours
Post-Anoxic	9.5' x 19'	15.6'	20,500 gal	2	41,000 gal	0.9 hours
MBR	22' x 12.5'	15.1'	30,000 gal	3	90,000 gal	1.9 hours
RAS Channel	42' x 5'	Varies	Varies	1	Varies	Varies
TOTAL	-	-	-	-	304,000 gal	6.5 hours

External carbon is dosed to the Post-Anoxic tank in order to further reduce nitrate (approximate dosing rate of 3.3 gallons per day of MicroC 2000 product).

5 Scope of Supply

The following proposed items will be supplied by Kubota Membrane USA and are included in the budgetary prices that are listed in Section 7. We are flexible in terms of scope of supply though, and are happy to adjust our scope to fit the project's needs.

5.1 Major Equipment and Instrumentation

Table 6: Major Equipment and Instrumentation in Kubota's Scope of Supply

Name	Type	Anticipated Size	HP	Quantity
Pre-Anoxic Zone Equipment				
Pre-Anoxic Mixer	Submersible	19,000 gallons	1.5	2
Aeration Zone Equipment				
Pre-Aeration Diffuser	Fine Bubble	471 scfm	--	2 sets
Pre-Aeration Blower	Positive Displacement	471 scfm 10 psig	30	2 duty (MBR is a common spare)
Air Flow Meter	Mass Air Flow, Insertion Style	8 inch	--	2
DO Meter	LDO Probe and Transmitter	--	--	2
Internal Recycle Pump	Submersible	903 gpm	5	2 duty + 2 standby
Internal Recycle Pump Flow Meter	Electromagnetic	8 inch	--	2
Level Transmitter	Diaphragm	--	--	2
Post-Anoxic Zone Equipment				
Post-Anoxic Mixer	Submersible	20,500 gallons	1.5	2
Membrane Zone Equipment				
Submerged Membrane Unit	Flat Plate	SP600	--	15
SMU Guide and Stabilizer	-	-	--	15 sets
MBR Blower	Positive Displacement	568scfm 8.7psig	0	3 duty + 1 standby
Air Flow Meter	Mass Air Flow, Insertion Style	--	--	3
Level Switch	Float	--	--	3 LL
Permeate Equipment				
Permeate Pump	Self-Priming Centrifugal	452 gpm	7.5	3 duty + 1 standby

Name	Type	Anticipated Size	HP	Quantity
Permeate Flow Meter	Electromagnetic	6 inch	--	3
Permeate Flow Control Valve	Modulating Butterfly Valve	6 inch	--	3
Permeate Turbidity Meter	Laser Meter and Transmitter	--	--	3
Permeate Pressure Transmitter	Diaphragm	--	--	3
RAS Channel Equipment				
RAS Pump	Submersible	897 gpm	10	2 duty + 1 standby
RAS Flow Meter	Electromagnetic	8 inch	--	2
Level Switch	Float	--	--	2 (HL + LL)
Level Transmitter	Diaphragm	--	--	1
WAS Pump	Submersible	65 gpm	1	1 duty + 1 standby
WAS Pump Flow Meter	Electromagnetic	2 inch	--	1
Other Equipment				
In-Basin Permeate Piping, Excluding Headers	Schedule 80 PVC w/ isolation valve	3-inch	--	30 sets
In-Basin Air Scour Drop Piping, Excluding Headers	304 Stainless Steel w/ CI isolation valve	3-inch	--	30 sets
CIP System	Chemical Injection System	--	--	1
Alum injection system	Peristaltic pumps, calibration column, injection quill	--	--	2 sets
MBR Control Panel, HMI	MBR Control Panel	--	--	1

5.2 Direct Services

The following services are included in Kubota's scope of supply:

Design Support

- Support during preliminary and final design.
- Construction submittals including shop drawings.
- Preparation and submittal of a system O&M manual for Kubota supplied systems and equipment.
- Equipment delivery coordination with the contractor.

Commissioning

- 15 days on-site for start-up and commissioning including dry and wet equipment checks, clean water testing, and support during seeding and start-up.
- 5 days on-site for performance testing.
- Additional days are available as needed.

Training

- 3 days of on-site, hands on operator training using a mix of classroom and field time. See Table 7 below for list of training topics.

Table 7: Training and Workshops Included in Kubota's Scope of Supply

Training/Workshop	Brief Summary
MBR HMI	1. Navigation of all HMI screens and menus. 2. Review of automatic operations and controls. 3. Changing process set points. 4. Overriding controls from the HMI. 5. Manual operation of the system in the event of a power failure.
CIP training	1. Navigation of CIP (Clean-In-Place), in-situ maintenance chemical cleaning. 2. Control from HMI and operation of manual valve. 3. Adjust set points of chemical flow.
Troubleshooting	1. Case study of troubleshooting 2. Recovery from trouble 3. "Fish bone" approach
Daily testing	1. Filterability test 2. Viscosity measurement

Workshop/Additional Training Available (No Charge)

- In addition to our standard training at commissioning, Kubota Membrane USA will host an annual operator workshop in which operators meet to exchange ideas and learn about the latest developments in MBR technology.
- Customized individual training, such as membrane disassembling training, is also available upon request.

Remote Monitoring Available (No Charge for First Year)

○ *Support by Remote Monitoring*

The Kubota membrane system as proposed includes an MBR HMI system that can be remotely monitored and controlled, provided wireless connectivity is available. Technical support staff can monitor the status of your system to proactively address potential problems. Whenever a call is placed to our service staff, that person will be able to log in to the MBR HMI system and easily see what is happening at the plant.

5.3 Exclusions to Kubota Scope of Supply

The following items are not currently included in the Kubota scope of supply:

- Performance and payment bond costs.
- Equipment installation.
- Pretreatment/headworks including coarse screen, fine screen, and grit removal.
 - ✓ Kubota recommends an internally-fed drum screen with perforated openings less than 2-mm, or similar. KMU can provide screens as part of the Scope of Supply at an additional cost.
- Overhead walkways and In-basin structural supports for the Submerged Membrane Units
 - ✓ KMU will provide SMU guide sets as shown in the scope of supply. Guide sets will require a support structure along the top of the tank.
- Seismic bracing for equipment.
 - ✓ KMU can perform the design of seismic bracing and supply bracing for an additional cost.
- Solids handling equipment and digestors.
- Permeate disinfection systems.
- Electrical system including primary and backup power, lighting, HVAC, etc.
- Variable frequency drives (VFDs) and motor controllers.
- Construction of concrete tanks, buildings, and structures.
- MBR air scour and permeate header pipes, and all other piping that is outside of the MBR tanks.
- Civil works including installation, connection of piping, installation of wiring for all Kubota supplied equipment and instrumentation.
- Equipment access platforms, walkways, ladders, or stairs.
- Equipment lifts or hoists.
- Heat tracing materials if needed.

6 Warranty

Equipment Warranty

Kubota's standard 2-year membrane warranty, and 1-year mechanical equipment warranty is included in the main budgetary price proposed (Table 8) and goes into effect at the commencement date of commissioning. The warranty included is a guarantee that the products supplied by Kubota are free from defect in material or workmanship.

7 Budgetary Price

The estimated budgetary price for the equipment and instrumentation described herein is shown below in Table 8. The pricing herein is for budgetary purposes only and does not constitute an offer of sale. Freight, taxes or duties are not included.

Table 8: Budgetary Price for Proposed Kubota MBR Equipment and Equipment

Budgetary Price – MBR Equipment, Instrumentation, and Services	
Budgetary Price	\$1,735,000

8 24/7 Technical Support

24/7 phone support is available in addition to support during regular business hours. 24-hour technical support calls are shared within the Kubota staff so that you can rest assured knowing that knowledgeable engineers and technicians are just a phone call away.

9 Additional Services (Optional)

The following service plans are optional and may be added to Kubota's scope of supply if desired for an additional cost.

Kubota Custom Membrane Support Plan

Kubota can customize your support/service package to meet your needs. The following table shows a variety of our available services:

Table 9: Kubota's Available Services

Service	Note
Periodical technical support	Monthly, Quarterly, Annually
24/7 phone support	
MBR HMI monitoring	Weekly, Monthly, Quarterly
Periodical site visit	Quarterly, Semi-annually, Annually
Membrane inspection	Annual, Semi-annual, 3x per year
Program (HMI, etc.) update	Based on hydraulic changes, such as increases in flow or changes in operation.

Aaron Whitenight

From: William LaPorte <wlaporte@envirep.com>
Sent: Tuesday, September 13, 2022 2:21 PM
To: Aaron Whitenight
Cc: Daniel String; Amber Steder; Xu Ye; 'Thea Davis (tdavis@aqua-aerobic.com)'; 'Tom Miles (tmiles@aqua-aerobic.com)'; 'Lounsbury, Dave (TLCEnvironmental@aol.com)'
Subject: [External Email] FW: Millington WWTP MD, Update Preliminary SBR Design --- Project# 106401D
Attachments: KCI Email Attachment; KCI Email Attachment

From IT@KCI.COM 410-316-7820 *** This is an External Email from outside of KCI.

Aaron,

In accordance with your request, please see attached updated preliminary design report (Design #168894) for phase 1 and design summary (Design#168895) for phase 2 of the Millington WWTP, MD project. These have been updated to reflect the most recent loadings and flows that you sent to us via email on 8/25/22.

For phase 1, design #168894 recommends a two (2) basin (57'x40') AquaSBR®, Sequencing Batch Reactor system, with two (2) packaged Aqua MiniDisk®, Cloth Media Filters, with ten (10) disks each. The basin dimensions have been increased due to the increased design flow. The post EQ basin (106'x11') and aerobic digester basin (57'x24') are included in the design. The digester has been sized to provide 30 days solids retention time. The preliminary budget price for biological design equipment, which includes freight to the jobsite and Aqua-Aerobic Systems' standard start-up supervision services, is \$1,049,450. The preliminary budget price for filter design equipment, which includes freight to the jobsite and Aqua-Aerobic Systems' standard start-up supervision services, is \$318,210.

Design #168895 recommends a three (3) basin(57'x40') AquaSBR®, Sequencing Batch Reactor, with three (3) package Aqua MiniDisk®, Cloth Media Filters, with ten (10) disks each. Because of the reduced flow for phase 2, we are able to handle the flow with a three-basin system instead of four, compared with the previous design. The postEQ basin for phase 1 can be applied to phase 2. An additional digester (40'x24') is included in the phase 2 design to expand the digester capacity and maintain 30 days solids retention time. 100% redundancy is included in both filter designs. As we do not know when the Phase II Design may take place, we offer a conservative budgetary estimate of \$524,725 for the addition of the third SBR Basin Equipment and the proposed digester equipment. The budgetary estimate to add the third 10-Disk Aqua MiniDisk Filter is \$170,000.

Please don't hesitate to contact me if you have any questions or need additional information.

Sincerely,

Bill LaPorte
Envirep, Inc., Eastern Pennsylvania Sales Office
Main Office: 717-761-7884
Direct: 717-972-0852
Mobile: 717-433-7837
Email: wlaporte@envirep.com

Click the logo to visit our website:



AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Process Design Report

MILLINGTON WWTP MD

Design# 168894

Option: Preliminary SBR Design Phase 1 Update

AquaSBR®

Sequencing Batch Reactor



September 1st, 2022

Designed By: Xu Ye

Design Notes

Design#: 168894

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 1 Update

Designed by Xu Ye on Wednesday, August 31, 2022



Upstream Recommendations

- Neutralization is required ahead of the biological system if the pH is expected to fall outside of 6.5-8.5 for significant durations.
- Coarse screening and grit removal is recommended (by others) ahead of the biological system.
- Elevated concentration of hydrogen sulfide can be detrimental to both civil and mechanical structures. If anaerobic conditions exist in the collection system, steps should be taken to eliminate hydrogen sulfide prior to the treatment system.

Flow Considerations

- The maximum flow, as shown on the design, has been assumed as a hydraulic maximum and does not represent an additional organic load.
- When flows are in excess of the maximum daily flow of 1 MGD, the biological system has been designed to modify cycles in order to process a peak hydraulic flow of 1.33 MGD.
- Depending upon the magnitude and duration of the peak flow, effluent quality may be degraded.

Biological Process

- The decanter performance is based upon a free-air discharge following the valve and immediately adjacent to the basin. Actual decanter performance depends upon the complete installation including specific liquid and piping elevations and any associated field piping losses to the final point of discharge. Modification of the high water level, low water level, centerline of discharge, and / or cycle structure may be required to achieve discharge of full batch volume based on actual site installation specifics.

Aeration

- The aeration system has been designed to provide 1.25 lbs. O₂/lb. BOD₅ applied and 4.6 lbs. O₂/lb. TKN applied at the design average loading conditions, while maintaining a residual DO concentration of 2 mg/l.
- A common standby blower will be shared among the biological reactors.
- Depending on the actual yard piping from the blowers to the diffuser system and the heat losses associated with the yard piping, additional provisions for cooling of the air (i.e. incorporating heat exchangers) and/or modification of in-basin piping and/or diffuser sleeve material may be required. Aqua-Aerobic Systems, Inc. may need to modify the following equipment offering to ensure compatibility of all in-basin components with actual air temperatures.

Process/Site

- The anticipated effluent nitrogen requirement is predicated upon an influent waste temperature of 12 °C or greater. While lower temperatures may be acceptable for a short-term duration, nitrification and (if required) denitrification below 10 °C can be unpredictable, requiring special operator attention.
- Sufficient alkalinity is required for nitrification, as approximately 7.1 mg alkalinity (as CaCO₃) is required for every mg of NH₃-N nitrified. If the raw water alkalinity cannot support this consumption, while maintaining a residual concentration of 50 mg/l, supplemental alkalinity shall be provided (by others).
- To achieve the effluent monthly average total phosphorus limit, the biological process, chemical feed systems, and Cloth Media Filters need to be designed to facilitate optimum performance.
- A minimum of twelve (12) daily composite samples per month (both influent and effluent) shall be obtained for total phosphorus analysis.
- Chemical feed lines (i.e. metal salts) shall be furnished to each reactor, aerobic digester and dewatering supernatant streams as necessary. Metal salts shall be added to each reactor during the React phase of the cycle.
- pH monitoring and control in a range of 6.8-7.2 of the biological reactor is required when adding metal salts.

Project: *MILLINGTON WWTP MD*

Option: *Preliminary SBR Design Phase 1 Update*

Designed by *Xu Ye on Wednesday, August 31, 2022*



- The cloth media filter will only remove TP that is associated with the TSS removed by the filter. Since only insoluble, particle-associated phosphorous is capable of being removed by filtration, phosphorous speciation shall be provided by the owner to substantiate the concentrations of soluble and insoluble phosphorous in the filter influent. If the proportions of soluble (unfilterable) and insoluble phosphorous are such that removal to achieve the desired effluent limit is not practical, the owner will provide for proper conditioning of the wastewater, upstream of the filter system, to allow for the required removal.

- The average, maximum and peak design flow and loading conditions, shown within the report, are based on maximum month average, maximum day and peak hour conditions, respectively.

Post-Secondary Treatment

-The following processes follow the Biological process: effluent flow equalization and post-aeration.

Filtration

- The cloth media filter recommendation and anticipated effluent quality are based upon influent water quality conditions as shown under "Design Parameters" of this Process Design Report.

- The filter influent should be free of algae and other solids that are not filterable through a nominal 5 micron pore size media. Provisions to treat algae and condition the solids to be filterable are the responsibility of others.

- The cloth media filter has been designed to handle the maximum design flow while maintaining one unit out of service.

- The capability to add metal salts (typically alum or ferric) and/or polymer ahead of the Cloth Media Filter is recommended. In addition, adequate mixing and at least 5 minutes retention time at the maximum daily flow must be provided as part of the chemical feed system. The chemical dosage should be flow-paced and controlled to avoid over-dosing. Jar testing with various chemicals is recommended to determine the most effective chemical as well as the optimum dosage.

Equipment

- Changes in basin geometry may require alterations in the equipment recommendation.

- The basins are not included and shall be provided by others.

- Influent is assumed to enter the reactor above the water level, away from the decanter, and to avoid splashing or direct discharge in the immediate vicinity of other equipment. If the influent enters the basin below the water level, adequate hydraulic capacity shall be made in the headworks to prevent backflow from one reactor to the other during transition of influent.

- Based on the process requirements and selected equipment, the reactor wall height should be at least 23 ft for biological reactors, 13.5 ft for post-equalization basin, and 23 ft for aerobic digester.

- Scope of supply includes freight, installation supervision and start-up services.

- Equipment selection is based upon the use of Aqua-Aerobic Systems' standard materials of construction and electrical components, suitable for non-classified electrical environments.

- The basin dimensions reported on the design have been assumed based upon the required volumes and assumed basin geometry. Actual basin geometry may be circular, square or rectangular with construction materials including concrete or steel.

- The control panel does not include motor starters or VFDs, which should be provided in a separate MCC (by others).

- Provisions should be made, by others, for overflows in each of the recommended basins.

- Aqua-Aerobic Systems, Inc. is familiar with various "Buy American" Acts (i.e. AIS, ARRA, Federal FAR 52.225, EXIM Bank, USAid, PA Steel Products Act, etc.). As the project develops Aqua-Aerobic Systems can work with you to ensure full compliance of our goods with various Buy American provisions if they are applicable/required for the project. When applicable, please provide us with the specifics of the project's "Buy American" provisions.

- If the cloth media filter will be offline for extended periods of time, protection from sunlight is required.

AquaSBR® - Sequencing Batch Reactor - Design Summary

Design#: 168894

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 1 Update

Designed by Xu Ye on Wednesday, August 31, 2022



DESIGN INFLUENT CONDITIONS

Avg. Design Flow (ADF)	= 0.67 MGD	= 2,536 m³/day
Max Design Flow (MDF)	= 1 MGD	= 3,785 m³/day
Peak Hyd. Flow (PHF)	= 1.33 MGD	= 5,035 m³/day (modifying cycles)

DESIGN PARAMETERS

	Influent	mg/l	Effluent (After Filtration)			
			Required	<= mg/l	Anticipated	<= mg/l
Bio/Chem Oxygen Demand:	BOD5	300	BOD5	10	BOD5	10
Total Suspended Solids:	TSS	225	TSSa	10	TSSa	10
Total Kjeldahl Nitrogen:	TKN	40	TKN	--	TKN	--
Total Nitrogen:	--	--	TN	3	TN	3
Total Phosphorus:	TP	8	TP	0.3	TP	0.3

SITE CONDITIONS

	Maximum		Minimum		Elevation (MSL)
Ambient Air Temperatures:	85 F	29.4 C	30 F	-1.1 C	25 ft
Influent Waste Temperatures:	68 F	20.0 C	54 F	12.0 C	7.6 m

SBR BASIN DESIGN VALUES

			Water Depth			Basin Vol./Basin		
No./Basin Geometry:	= 2 Rectangular Basin(s)		Min (LWL)	= 13.7 ft	= (4.2 m)	Min (Vlwl)	= 0.233 MG	= (882.6 m³)
Freeboard:	= 2.0 ft	= (0.6 m)	Avg (AWL)	= 18.6 ft	= (5.7 m)	Avg (Vawl)	= 0.317 MG	= (1,199.7 m³)
Length of Basin:	= 57.0 ft	= (17.4 m)	Max (HWL)	= 21.0 ft	= (6.4 m)	Max (Vhwl)	= 0.358 MG	= (1,355.8 m³)
Width of Basin:	= 40.0 ft	= (12.2 m)						

Number of Cycles:	= 4 per day/basin	
Cycle Duration:	= 6.0 hr/cycle	
Food/Mass (F/M) ratio:	= 0.096 lbs. BOD5/lb. MLSS-Day	
MLSS Concentration:	= 4,500 mg/l @ LWL	
Hydraulic Retention Time:	= 0.946 days @ AWL	
Solids Retention Time:	= 14.1 days	
Est. Net Sludge Yield:	= 0.709 lbs. WAS/lb. BOD5	
Est. Dry Solids Produced:	= 1,189.1 lbs. WAS/day	= (539.4 kg/day)
Est. Solids Flow Rate:	= 200 gpm (14,258 gal/day)	= (54.0 m³/day)
Decant Flow Rate @ MDF:	= 2,083 gpm (as avg. from HWL to LWL)	= (131.4 l/sec)
LWL to CenterLine Discharge:	= 1.35 ft	= (0.4 m)
Lbs. O2/lb. BOD5	= 1.25	
Lbs. O2/lb. TKN	= 4.6	
Actual Oxygen Required:	= 3,124 lbs./day	= (1,416.8 kg/day)
Air Flowrate/Basin:	= 931 SCFM	= (26.4 Sm³/min)
Max. Discharge Pressure:	= 10.7 PSIG	= (74 KPA)
Daily Max. Month Avg. Estimated Power*:	= 713.2 kWh/day	

* Power consumption calculations in this document are based on maximum month conditions. Detailed power vs. loading calculations can be provided if requested.

Post-Equalization - Design Summary

Design#: 168894

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 1 Update

Designed by Xu Ye on Wednesday, August 31, 2022



AQUA-AEROBIC
SYSTEMS, INC.
A Metawater Company

POST-SBR EQUALIZATION DESIGN PARAMETERS

Avg. Daily Flow (ADF):	= 0.67 MGD	= (2,536 m ³ /day)
Max. Daily Flow (MDF):	= 1 MGD	= (3,785 m ³ /day)
Decant Flow Rate from (Qd):	= 2,083 gpm	= (7.9 m ³ /M)
Decant Duration (Td):	= 60 min	
Number Decants/Day:	= 8	
Time Between Start of Decants:	= 180 min	

POST-SBR EQUALIZATION VOLUME DETERMINATION

The volume required for equalization/storage shall be provided between the high and the low water levels of the basin(s). This Storage Volume (Vs) has been determined by the following:

$$V_s = [(Q_d - (MDF \times 694.4)) \times T_d] = 83,313 \text{ gal} = (11,138.1 \text{ ft}^3) = (315.4 \text{ m}^3)$$

The volumes determined in this summary reflect the minimum volumes necessary to achieve the desired results based upon the input provided to Aqua. If other hydraulic conditions exist that are not mentioned in this design summary or associated design notes, additional volume may be warranted.

Based upon liquid level inputs from each SBR reactor prior to decant, the rate of discharge from the Post-SBR Equalization basin shall be pre-determined to establish the proper number of pumps to be operated (or the correct valve position in the case of gravity flow). Level indication in the Post-SBR Equalization basin(s) shall override equipment operation.

POST-SBR EQUALIZATION BASIN DESIGN VALUES

No./Basin Geometry:	= 1 Rectangular Basin(s)				
Length of Basin:	= 106.0 ft	= (32.3 m)			
Width of Basin:	= 11.0 ft	= (3.4 m)			
Min. Water Depth:	= 1.5 ft	= (0.5 m)	Min. Basin Vol. Basin:	= 13,082.6 gal	= (49.5 m ³)
Max. Water Depth:	= 11.1 ft	= (3.4 m)	Max. Basin Vol. Basin:	= 96,395.9 gal	= (364.9 m ³)

POST-SBR EQUALIZATION EQUIPMENT CRITERIA

Mixing Energy with Diffusers:	= 15 SCFM/1000 ft ³	
SCFM Required to Mix:	= 193 SCFM/basin	= (328 Nm ³ /hr/basin)
Max. Discharge Pressure:	= 5.4 PSIG	= (36.95 KPA)
Max. Flow Rate Required Basin:	= 694 gpm	= (2.629 m ³ /min)
Avg. Power Required:	= 121.9 kW-hr/day	

Aerobic Digester - Design Summary

Design#: 168894

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 1 Update

Designed by Xu Ye on Wednesday, August 31, 2022



AEROBIC DIGESTER DESIGN PARAMETERS

Sludge Flowrate to the Digester	= 14,250.6 gal/day	= (53.9 m ³ /day)
Inlet Sludge Concentration	= 1.00%	
Solids Loading to the Digester	= 1,188.5 lb/day	= (539.1 kg/day)
Inlet Volatile Solids Fraction	= 75.5%	

AEROBIC DIGESTER BASIN DESIGN VALUES

No./Basin Geometry:	= 1 Rectangular Basin(s)		
Length of Basin:	= 57 ft	= (17.4 m)	
Width of Basin:	= 24 ft	= (7.3 m)	
Min. Water Depth:	= 14.7 ft	= (4.5 m)	Min. Basin Vol. Basin: = 150,419.8 gal = (569.4 m ³)
Max. Water Depth:	= 21 ft	= (6.4 m)	Max. Basin Vol. Basin: = 214,885.5 gal = (813.5 m ³)

AEROBIC DIGESTER PROCESS DESIGN PARAMETERS

Solids Retention Time:	= 30.2 days	
Digester Design Temperature:	= 20 C	
Volatile Solids Destruction:	= 41.5%	
Digester Solids Concentration:	= 2%	
Oxygen Supplied for Digestion:	= 2 lbs O ₂ per lb VSS Destroyed	
Oxygen Distribution Per Basin:	= 100.0%	
Actual Oxygen Required:	= 744.8 lb/day	= (337.8 kg/day)
Volatile Percentage After Digestion:	= 64.3%	
Estimated Dry Solids to be Removed:	= 816.1 lb/day	= (370.2 kg/day)
Volume of Solids to be Removed:	= 4,892.8 gal/day	= (18.52 m ³ /day)
Estimated Supernatant Volume:	= 64,465.6 gal/basin	= (244.03 m ³ /basin)
Assumed Supernatant Duration:	= 180 minutes	
Calculated Supernatant Flow:	= 358.1 gpm	= (22.6 l/sec)

1. The Volatile Solids Destruction listed above shall be used for determination of the oxygen demand during summer conditions. It should be noted that the actual VSS destruction will be dependant upon digester inlet condition, temperature, and operating conditions.
2. The Digester Solids Concentration is reflected as an average concentration, assuming the operations include frequent settling and supernating practices.

AEROBIC DIGESTER EQUIPMENT CRITERIA

SCFM Required for O ₂ Demand:	= 331/basin	= (562 m ³ /hr/basin)
Mixing Energy with Diffusers (Coarse):	= 30 SCFM/1000 ft ³	
SCFM Required to Mix:	= 862 SCFM/basin	= (1,464 Nm ³ /hr/basin)
Max. Discharge Pressure:	= 9.67 PSIG	= (66.70 KPA)
Max. Flow Rate Required Basin:	= 200 gpm	= (0.757 m ³ /min)
Avg. Power Required:	= 608.57 kW-hr/day	

AquaDisk® Tertiary Filtration - Design Summary

Design#: 168894

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 1 Update

Designed by Xu Ye on Wednesday, August 31, 2022



AQUA-AEROBIC
SYSTEMS, INC.
A Metawater Company

DESIGN INFLUENT CONDITIONS

Pre-Filter Treatment: AquaSBR

Avg. Design Flow = 0.67 MGD = 465.28 gpm = 2536.23 m³/day

Max Design Flow = 1.00 MGD = 694.44 gpm = 3785.41 m³/day

AquaDisk FILTER RECOMMENDATION

Qty Of Filter Units Recommended = 2

Number Of Disks Per Unit = 10

Total Number Of Disks Recommended = 20

Total Filter Area Provided = 216.0 ft² = (20.07 m²)

Filter Model Recommended = AquaDisk Package: Model ADFSP-11-10E-PC

Filter Media Cloth Type = OptiFiber PES-14®

AquaDisk FILTER CALCULATIONS

Filter Type:

Vertically Mounted Cloth Media Disks featuring automatically operated vacuum backwash. Tank shall include a hopper-bottom and solids removal manifold system.

Average Flow Conditions:

Average Hydraulic Loading = Avg. Design Flow (gpm) / Recommended Filter Area (ft²)
= 465.3 / 216 ft²
= 2.15 gpm/ft² (5.27 m/hr) at Avg. Flow

Maximum Flow Conditions:

Maximum Hydraulic Loading = Max. Design Flow (gpm) / Recommended Filter Area (ft²)
= 694.4 / 216 ft²
= 3.22 gpm/ft² (7.86 m/hr) at Max. Flow

Solids Loading:

Solids Loading Rate = (lbs TSS/day at max flow and max TSS loading) / Recommended Filter Area (ft²)
= 125.1 lbs/day / 216 ft²
= 0.58 lbs. TSS /day/ft² (2.82 kg. TSS/day/m²)

The above recommendation is based upon the provision to maintain a satisfactory hydraulic surface loading with (1) unit out of service. The resultant hydraulic loading rate at the Maximum Design Flow is: 6.4 gpm / ft² = (15.7 m/hr)

Equipment Summary

Design#: 168894

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 1 Update

Designed by Xu Ye on Wednesday, August 31, 2022



AquaSBR

Influent Valves

2 Influent Valve(s) will be provided as follows:

- 10 inch DeZurik electrically operated Plug Valve(s).

Mixers

2 AquaDDM Direct Drive Mixer(s) will be provided as follows:

- 10 HP Aqua-Aerobic Systems Endura Series Model FSS DDM Mixer(s).

Mixer Mooring

2 Mixer pivotal mooring assembly(ies) consisting of:

- 304 stainless steel pivotal mooring arm(s).
- #12 AWG-four conductor electrical service cable(s).
- Electrical cable strain relief grip(s), 2 eye, wire mesh.

Decaners

2 Decanter assembly(ies) consisting of:

- 8x7 Aqua-Aerobics decanter(s) with fiberglass float, 304 stainless steel weir, galvanized restrained mooring frame, and painted steel power section with #14-10 conductor power cable wired into a NEMA 4X stainless steel junction box with terminal strips for the single phase, 60 hertz actuator and limit switches.
- Decant pipe(s).
- 4" schedule 40 galvanized steel mooring post.
- Galvanized steel dewatering support post(s).
- 12 inch DeZurik electrically operated butterfly valve(s) with Limitorque actuator.

Transfer Pumps/Valves

2 Submersible pump assembly(ies) consisting of the following items:

- 2.7 HP Submersible Pump(s) with painted cast iron pump housing, discharge elbow, and multi-conductor electrical cable.
- Manual plug valve(s).
- 3 inch diameter swing check valve.
- Upper guide bar bracket(s).
- Set(s), 2 inch diameter 304 stainless steel slide rails.

Retrievable Fine Bubble Diffusers

6 Retrievable Fine Bubble Diffuser Assembly(ies) consisting of:

- 25 diffuser tubes consisting of two flexible EPDM porous membrane sheaths mounted on a rigid support pipe with 304 stainless steel band clamps.
- 304 stainless steel manifold weldment.
- 304 stainless steel leveling angles.
- 304 stainless steel leveling studs.
- Galvanized vertical support beam.
- Galvanized vertical air column assembly.
- Galvanized upper vertical beam and pulley assembly.
- Galvanized top support bracket.
- 3" EPDM flexible air line with ny-glass quick disconnect end fittings.
- Galvanized threaded flange.

Equipment Summary

Design#: 168894

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 1 Update

Designed by Xu Ye on Wednesday, August 31, 2022



- Ny-glass quick disconnect cam lock adapter.
- 304 stainless steel adhesive anchors.
- Brace angles.

1 Diffuser Electric Winch(es) will be provided as follows:

- Portable electric winch.

Positive Displacement Blowers

3 Positive Displacement Blower Package(s), with each package consisting of:

- ROOTS 409 Positive Displacement Blower Package with common base, V-belt drive, enclosed drive guard, pressure gauge, pressure relief valve, and vibration pads.
- Stainless steel anchors.
- 40 HP motor with slide base.
- Inlet filter and inlet silencer.
- Discharge silencer, check valve, manual butterfly isolation valve, and flexible discharge connector.

Air Valves

2 Air Control Valve(s) will be provided as follows:

- 6 inch DeZurik electrically operated butterfly valve(s) with Limitorque actuator.

Level Sensor Assemblies

2 Pressure Transducer Assembly(ies) each consisting of:

- Pressure transducer(s).
- Mounting bracket weldment(s).
- Transducer mounting pipe weldment(s).

2 Level Sensor Assembly(ies) will be provided as follows:

- Float switch(es).
- Float switch mounting bracket(s).
- Stainless steel anchors.

Instrumentation

2 Dissolved Oxygen Assembly(ies) consisting of:

- DO probe(s).

2 Process Controller(s) consisting of:

- Hach SC4500 controller and display module(s).

AquaSBR: Post-Equalization

Transfer Pumps/Valves

3 Submersible pump assembly(ies) consisting of the following items:

- 3 HP Submersible Pump(s) with painted cast iron pump housing, discharge elbow, and multi-conductor electrical cable.
- 3 inch diameter plug valve(s).
- Manual plug valve(s).
- Upper guide bar bracket(s).
- 304 stainless steel guide bar(s).

Fixed Coarse Bubble Diffusers

1 Aqua-Aerobic's Fixed Coarse Bubble Diffuser System(s) consisting of the following components:

Equipment Summary

Design#: 168894

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 1 Update

Designed by Xu Ye on Wednesday, August 31, 2022



- PVC diffuser(s).
- Schedule 40 galvanized steel riser pipe(s).
- Schedule 40 PVC manifold piping.
- Stainless steel anchors.

Positive Displacement Blowers

1 Positive Displacement Blower Package(s), with each package consisting of:

- ROOTS 36 Positive Displacement Blower Package with common base, V-belt drive, enclosed drive guard, pressure gauge, pressure relief valve, and vibration pads.
- Stainless steel anchors.
- 10 HP motor with slide base.
- Inlet filter and inlet silencer.
- Discharge silencer, check valve, manual butterfly isolation valve, and flexible discharge connector.

Level Sensor Assemblies

1 Pressure Transducer Assembly(ies) each consisting of:

- Pressure transducer(s).
- Mounting bracket weldment(s).
- Transducer mounting pipe weldment(s).

1 Level Sensor Assembly(ies) will be provided as follows:

- Float switch(es).
- Float switch mounting bracket(s).
- Stainless steel anchors.

AquaSBR: Aerobic Digester

Supernatant Withdrawal

1 Floating Weir Assembly(ies) consisting of:

- 6x4 Aqua-Aerobics floating weir(s) with fiberglass float, 304 stainless steel weir, galvanized restrained mooring frame, and painted steel base plate.
- 6 inch diameter decant hose assembly.
- 4" schedule 40 galvanized restrained mooring post(s) with base plate.

Transfer Pumps/Valves

1 Submersible pump assembly(ies) consisting of the following items:

- 2.7 HP Submersible Pump(s) with painted cast iron pump housing, discharge elbow, and multi-conductor electrical cable.
- Manual plug valve(s).
- 3 inch diameter swing check valve.
- Upper guide bar bracket(s).
- Set(s), 2 inch diameter 304 stainless steel slide rails.

Fixed Coarse Bubble Diffusers

1 Aqua-Aerobic's Fixed Coarse Bubble Diffuser System(s) consisting of the following components:

- PVC diffuser(s).
- Schedule 40 galvanized steel riser pipe(s).
- Stainless steel anchors.

Positive Displacement Blowers

Equipment Summary

Design#: 168894

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 1 Update

Designed by Xu Ye on Wednesday, August 31, 2022



2 Positive Displacement Blower Package(s), with each package consisting of:

- ROOTS 616 Positive Displacement Blower Package with common base, V-belt drive, enclosed drive guard, pressure gauge, pressure relief valve, and vibration pads.
- Stainless steel anchors.
- 75 HP motor with slide base.
- Inlet filter and inlet silencer.
- Discharge silencer, check valve, manual butterfly isolation valve, and flexible discharge connector.

Level Sensor Assemblies

1 Sensor installation(s) consisting of:

- Pressure transducer(s).
- Stainless steel sensor guide rail weldment(s).
- PVC sensor mounting pipe(s).
- Top support(s).

1 Level Sensor Assembly(ies) will be provided as follows:

- Float switch(es).
- Float switch mounting bracket(s).
- Stainless steel anchors.

Controls

Controls wo/Starters

1 Controls Package(s) will be provided as follows:

- NEMA 12 panel enclosure suitable for indoor installation and constructed of painted steel.
- Fuse(s) and fuse block(s).
- Compactlogix Processor.
- Operator interface(s).
- Remote access Ethernet modem(s).

Cloth Media Filters

AquaDisk Tanks/Basins

2 AquaDisk Model # ADFSP-11x10E-PC Package Filter Painted Steel Tank(s) consisting of:

- 10 Disk painted steel tank(s).
- 2" ball valve(s).

AquaDisk Centertube Assemblies

2 Cloth set(s) will have the following feature:

- Cloth will be OptiFiber PES-14.

2 Centertube(s) consisting of:

- 304 stainless steel centertube weldment(s).
- Centertube driven sprocket(s).
- Dual wheel assembly(ies).
- Rider wheel bracket assembly(ies).
- Centertube bearing kit(s).
- Effluent centertube lip seal.
- Pile cloth media and non-corrosive support frame assemblies.
- 304 Stainless steel frame top plate(s),

Equipment Summary

Design#: 168894

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 1 Update

Designed by Xu Ye on Wednesday, August 31, 2022



- Media sealing gaskets.
- Disk segment 304 stainless steel support rods.

AquaDisk Drive Assemblies

2 Drive System(s) consisting of:

- Gearbox with motor.
- Drive sprocket(s).
- Drive chain(s) with pins.
- Stationary drive bracket weldment(s).
- Adjustable drive bracket weldment(s).
- Chain guard weldment(s).
- Warning label(s).

AquaDisk Backwash/Sludge Assemblies

2 Backwash System(s) consisting of:

- Backwash shoe assemblies.
- Backwash shoe support weldment(s).
- 1 1/2" flexible hose.
- Stainless steel backwash shoe springs.
- Hose clamps.

2 Backwash/Solids Waste Pump(s) consisting of:

- Backwash/waste pump(s).
- 0 to 15 psi pressure gauge(s).
- 0 to 30 inches mercury vacuum gauge(s).
- Throttling gate valve(s).
- 2" bronze 3 way ball valve(s).

AquaDisk Instrumentation

2 Pressure Transmitter(s) consisting of:

- Level transmitter(s).

2 Float Switch(es) consisting of:

- Float switch(es).

2 Vacuum Transmitter(s) consisting of:

- Vacuum transmitter(s).

AquaDisk Valves

2 Solids Waste Valve(s) consisting of:

- 2" full port, three piece, stainless steel body ball valve(s), grooved end connections with single phase electric actuator(s). Valve / actuator combination shall be TCI / RCI (RCI, a division of Rotork).
- 2" flexible hose.
- Victaulic coupler(s).

2 Set(s) of Backwash Valves consisting of:

- 2" full port, three piece, stainless steel body ball valve(s), grooved end connections with single phase electric actuator(s). Valve / actuator combination shall be TCI / RCI (RCI, a division of Rotork).
- 2" flexible hose.
- Victaulic coupler(s).

AquaDisk Controls w/Starters

Equipment Summary

Design#: 168894

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 1 Update

Designed by Xu Ye on Wednesday, August 31, 2022



2 Control Panel(s) consisting of:

- NEMA 4X fiberglass enclosure(s).
- Circuit breaker with handle.
- Transformer(s).
- Fuses and fuse blocks.
- Line filter(s).
- GFI convenience outlet(s).
- Control relay(s).
- Selector switch(es).
- Indicating pilot light(s).
- MicroLogix 1400 PLC(s).
- Ethernet switch(es).
- Operator interface(s).
- Power supply(ies).
- Motor starter(s).
- Terminal blocks.
- UL label(s).

2 Conduit Installation(s) consisting of:

- PVC conduit and fittings.



AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Process Design Report

MILLINGTON WWTP MD

Design# 168895
Option: Preliminary SBR Design Phase 2
Summary Update

AquaSBR®

Sequencing Batch Reactor



September 1st, 2022
Designed By: Xu Ye

AquaSBR® - Sequencing Batch Reactor - Design Summary

Design#: 168895

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 2 Summary Update

Designed by Xu Ye on August 31, 2022



DESIGN INFLUENT CONDITIONS

Avg. Design Flow (ADF)	= 1.05 MGD	= 3,975 m ³ /day
Max Design Flow (MDF)	= 1.57 MGD	= 5,943 m ³ /day
Peak Hyd. Flow (PHF)	= 2.09 MGD	= 7,912 m ³ /day (modifying cycles)

DESIGN PARAMETERS	Influent	mg/l	Effluent (After Filtration)			
			Required	<= mg/l	Anticipated	<= mg/l
Bio/Chem Oxygen Demand:	BOD5	300	BOD5	10	BOD5	10
Total Suspended Solids:	TSS	225	TSSa	10	TSSa	10
Total Kjeldahl Nitrogen:	TKN	40	TKN	--	TKN	--
Total Nitrogen:	--	--	TN	3	TN	3
Total Phosphorus:	TP	8	TP	0.3	TP	0.3

SITE CONDITIONS

	Maximum		Minimum		Elevation (MSL)
Ambient Air Temperatures:	85 F	29.4 C	30 F	-1.1 C	25 ft
Influent Waste Temperatures:	68 F	20.0 C	54 F	12.0 C	7.6 m

SBR BASIN DESIGN VALUES

			Water Depth			Basin Vol./Basin		
No./Basin Geometry:	= 3 Rectangular Basin(s)		Min (LWL)	= 13.3 ft	= (4.1 m)	Min (Vlwl)	= 0.227 MG	= (860.5 m ³)
Freeboard:	= 2.0 ft	= (0.6 m)	Avg (AWL)	= 18.5 ft	= (5.6 m)	Avg (Vawl)	= 0.315 MG	= (1,191.8 m ³)
Length of Basin:	= 57.0 ft	= (17.4 m)	Max (HWL)	= 21.0 ft	= (6.4 m)	Max (Vhwl)	= 0.358 MG	= (1,355.8 m ³)
Width of Basin:	= 40.0 ft	= (12.2 m)						

Number of Cycles:	= 4 per day/basin	
Cycle Duration:	= 6.0 hr/cycle	
Food/Mass (F/M) ratio:	= 0.103 lbs. BOD5/lb. MLSS-Day	
MLSS Concentration:	= 4,500 mg/l @ LWL	
Hydraulic Retention Time:	= 0.899 days @ AWL	
Solids Retention Time:	= 13.1 days	
Est. Net Sludge Yield:	= 0.709 lbs. WAS/lb. BOD5	
Est. Dry Solids Produced:	= 1,863.3 lbs. WAS/day	= (845.2 kg/day)
Est. Solids Flow Rate:	= 200 gpm (22,341 gal/day)	= (84.6 m ³ /day)
Decant Flow Rate @ MDF:	= 2,379 gpm (as avg. from HWL to LWL)	= (150.1 l/sec)
LWL to CenterLine Discharge:	= 1.0 ft	= (0.3 m)
Lbs. O2/lb. BOD5	= 1.25	
Lbs. O2/lb. TKN	= 4.6	
Actual Oxygen Required:	= 4,895 lbs./day	= (2,220.4 kg/day)

Post-Equalization - Design Summary

Design#: 168895

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 2 Summary Update

Designed by Xu Ye on August 31, 2022



AQUA-AEROBIC
SYSTEMS, INC.
A Metawater Company

POST-SBR EQUALIZATION DESIGN PARAMETERS

Avg. Daily Flow (ADF):	= 1.05 MGD	= (3,975 m ³ /day)
Max. Daily Flow (MDF):	= 1.57 MGD	= (5,943 m ³ /day)
Decant Flow Rate from (Qd):	= 2,379 gpm	= (9.0 m ³ /M)
Decant Duration (Td):	= 55 min	
Number Decants/Day:	= 12	
Time Between Start of Decants:	= 120 min	

POST-SBR EQUALIZATION VOLUME DETERMINATION

The volume required for equalization/storage shall be provided between the high and the low water levels of the basin(s). This Storage Volume (Vs) has been determined by the following:

$$V_s = [(Q_d - (MDF \times 694.4)) \times T_d] = 70,880 \text{ gal} = (9,475.9 \text{ ft}^3) = (268.3 \text{ m}^3)$$

The volumes determined in this summary reflect the minimum volumes necessary to achieve the desired results based upon the input provided to Aqua. If other hydraulic conditions exist that are not mentioned in this design summary or associated design notes, additional volume may be warranted.

Based upon liquid level inputs from each SBR reactor prior to decant, the rate of discharge from the Post-SBR Equalization basin shall be pre-determined to establish the proper number of pumps to be operated (or the correct valve position in the case of gravity flow). Level indication in the Post-SBR Equalization basin(s) shall override equipment operation.

POST-SBR EQUALIZATION BASIN DESIGN VALUES

No./Basin Geometry:	= 1 Rectangular Basin(s)				
Length of Basin:	= 106.0 ft	= (32.3 m)			
Width of Basin:	= 11.0 ft	= (3.4 m)			
Min. Water Depth:	= 1.5 ft	= (0.5 m)	Min. Basin Vol. Basin:	= 13,082.5 gal	= (49.5 m ³)
Max. Water Depth:	= 9.6 ft	= (2.9 m)	Max. Basin Vol. Basin:	= 83,962.2 gal	= (317.9 m ³)

Aerobic Digester - Design Summary

Design#: 168895

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 2 Summary Update

Designed by Xu Ye on August 31, 2022



AEROBIC DIGESTER DESIGN PARAMETERS

Sludge Flowrate to the Digester	= 22,333.5 gal/day	= (84.5 m ³ /day)
Inlet Sludge Concentration	= 1.00%	
Solids Loading to the Digester	= 1,862.6 lb/day	= (844.9 kg/day)
Inlet Volatile Solids Fraction	= 75.5%	

AEROBIC DIGESTER BASIN DESIGN VALUES

No./Basin Geometry:	= 1 Rectangular Basin(s)			
Length of Basin:	= 57 ft	= (17.4 m)		
Width of Basin:	= 24 ft	= (7.3 m)		
Min. Water Depth:	= 14.7 ft	= (4.5 m)	Min. Basin Vol. Basin:	= 150,419.8 gal = (569.4 m ³)
Max. Water Depth:	= 21 ft	= (6.4 m)	Max. Basin Vol. Basin:	= 214,885.5 gal = (813.5 m ³)
No./Basin Geometry:	= 1 Additional Rectangular Basin			
Length of Basin:	= 40 ft	= (12.2 m)		
Width of Basin:	= 24 ft	= (7.3 m)		
Min. Water Depth:	= 14.7 ft	= (4.5 m)	Min. Basin Vol. Basin:	= 105,557.8 gal = (399.7 m ³)
Max. Water Depth:	= 21 ft	= (6.4 m)	Max. Basin Vol. Basin:	= 150,796.8 gal = (570.9 m ³)

AEROBIC DIGESTER PROCESS DESIGN PARAMETERS

Solids Retention Time:	= 32.7 days	
Digester Design Temperature:	= 20 C	
Volatile Solids Destruction:	= 42.5%	
Digester Solids Concentration:	= 2%	
Oxygen Supplied for Digestion:	= 2 lbs O ₂ per lb VSS Destroyed	
Oxygen Distribution Per Basin:	= 100.0%	
Actual Oxygen Required:	= 1,195.3 lb/day	= (542.2 kg/day)
Volatile Percentage After Digestion:	= 63.9%	
Estimated Dry Solids to be Removed:	= 1,264.9 lb/day	= (573.8 kg/day)
Volume of Solids to be Removed:	= 7,583.6 gal/day	= (28.71 m ³ /day)
Estimated Supernatant Volume:	= 109,704.7 gal/basin	= (415.28 m ³ /basin)
Assumed Supernatant Duration:	= 180 minutes	
Calculated Supernatant Flow:	= 609.5 gpm	= (38.5 l/sec)

1. The Volatile Solids Destruction listed above shall be used for determination of the oxygen demand during summer conditions. It should be noted that the actual VSS destruction will be dependant upon digester inlet condition, temperature, and operating conditions.
2. The Digester Solids Concentration is reflected as an average concentration, assuming the operations include frequent settling and supernating practices.

Project: MILLINGTON WWTP MD

Option: Preliminary SBR Design Phase 2 Summary Update

Designed by Xu Ye on August 31, 2022

AQUA-AEROBIC
SYSTEMS, INC.
A Metawater Company**DESIGN INFLUENT CONDITIONS**

Pre-Filter Treatment: SBR

Avg. Design Flow = 1.05 MGD = 729.17 gpm = 3974.68 m³/dayMax Design Flow = 1.57 MGD = 1090.28 gpm = 5943.10 m³/day

The filtration system shall be designed based upon flow equalization after the SBR and prior to filtration.

AquaDisk FILTER RECOMMENDATION

Qty Of Filter Units Recommended = 3

Number Of Disks Per Unit = 10

Total Number Of Disks Recommended = 30

Total Filter Area Provided = 324.0 ft² = (30.10 m²)

Filter Model Recommended = AquaDisk Package: Model ADFSP-11-10E-PC

Filter Media Cloth Type = OptiFiber PES-14®

AquaDisk FILTER CALCULATIONS**Filter Type:**

Vertically Mounted Cloth Media Disks featuring automatically operated vacuum backwash. Tank shall include a hopper-bottom and solids removal manifold system.

Average Flow Conditions:Average Hydraulic Loading = Avg. Design Flow (gpm) / Recommended Filter Area (ft²)= 729.2 / 324 ft²= 2.25 gpm/ft² (5.50 m/hr) at Avg. Flow**Maximum Flow Conditions:**Maximum Hydraulic Loading = Max. Design Flow (gpm) / Recommended Filter Area (ft²)= 1090.3 / 324 ft²= 3.37 gpm/ft² (8.23 m/hr) at Max. Flow**Solids Loading:**Solids Loading Rate = (lbs TSS/day at max flow and max TSS loading) / Recommended Filter Area (ft²)= 196.4 lbs/day / 324 ft²= 0.61 lbs. TSS /day/ft² (2.96 kg. TSS/day/m²)The above recommendation is based upon the provision to maintain a satisfactory hydraulic surface loading with (1) unit out of service. The resultant hydraulic loading rate at the Maximum Design Flow is: 5.1 gpm / ft² = (12.3 m/hr)



3020 Gore Road
London, Ontario N5V 4T7
1-888-220-6118
Tel: (519) 457-3400 / Fax: (519) 457-3030
www.trojanuv.com

**Trojan System UV3000™PTP
Municipal Wastewater Disinfection Equipment**

Project Name: Millington, MD WWTP

Quote Number: V22144

Date: August 30, 2022

Prepared For:	Mr. Aaron Whitenight	Phone:	302-463-9317
Company:	KCI Technologies	Fax:	
		Email:	aaron.whitenight@kci.com

UV SYSTEM DESIGN PARAMETERS		GUARANTEED PERFORMANCE	
Peak Design Flow	1.00 MGD	Validated UV Dose	30,000 uWs/cm ² / 30 mJ/cm ²
UV Transmittance	65 %, minimum	Disinfection Limit	< 126 E. coli /100 mL
TSS Concentration	10 mg/L, 30-day average		on a 30-day geometric mean

EQUIPMENT DETAILS

TrojanUV 3000PTP Model 3800K in Series

(capable of disinfecting up to 1.12 MGD with one bank of UV lamps offline)

- One (1) Complete UV system supplied with Type 304 Stainless Steel Channel, Module Support Racks, Level Control Weir, Monitoring Systems, Control Panel, Spare Parts Package, Operators Kit and Maintenance Rack.
- 16 Type 316 Stainless Steel Modules supplied, containing four (4) UV lamps each module– Total of 64 UV lamps in the UV system.
- Each UV module weighs 38 pounds and is easily handled by one person.
- Each UV module has a standard 120V plug and 10 foot weatherproof cable for connection to GFI receptacle.
- Eight (8) outdoor-rated GFI Power Distribution Receptacles supplied (one for 2 modules).
- Each lamp consumes 87.5 Watts – Total system power requirement of 5,600 Watts (50.8 amps).
- Lamp on/off status indicated on each UV module using LED indicators.
- Monitoring System provided for local indication of UV intensity, lamp age and alarms.
- Remote indication of UV intensity and low UV intensity alarm available.
- Monitoring System requires 120V, single phase, 2 wire plus ground, 5 amp power supply, 60 Hz.
- Please refer to the enclosed drawings and specifications for full design details and requirements.

COMMERCIAL DETAILS

- Comprehensive Lamp Warranty: Full replacement (non pro-rated) up to 12,000 hours or thirty-six (36) calendar months from shipment, whichever comes first.
- System Warranty: 12 months after substantial completion or 18 months after shipment, whichever occurs first.
- 3 Copies of Shop Drawings and O&M Manuals will be supplied.
- Equipment Delivered 3-5 weeks after release for fabrication (approved shop drawings).
- Prices do not include any duties or taxes that may be applicable.
- Prices are FOB factory, freight paid to jobsite.
- Start-up and Training provided by Trojan-certified local service provider and included in the Quote.

Price **\$ 99,283.00**

Please contact me if you have any questions about this design. I look forward to working with you on this project.

Rep Name:	John Seaman	Phone:	410-726-2960
Rep Company:	Heyward Incorporated	Fax:	
Email:	jseaman@heywardinc.com		

Additional Information:

UV3000™ B PROPOSAL

August 30, 2022

Mr. Aaron Whitenight
KCI Technologies

Reference: Millington, MD WWTP
Quote No: JMM2293

In response to your request, we are pleased to provide the following **Trojan System UV3000™B** proposal for the **Millington WWTP** project. Since Trojan introduced the open channel approach to disinfection in 1982, many municipalities have selected ultraviolet as the preferred method pathogen destruction at their facilities.

The **Trojan System UV3000™B** utilizes low pressure low intensity lamp technology. All of Trojan's UV systems are modular in design, with each design specific to the effluent criteria. The lamps are oriented in a horizontal configuration parallel to the flow.

Please review carefully our design criteria for peak flow rate, total suspended solids, disinfection limit, and UV transmittance to ensure that the criteria used match actual project parameters. When detailed project design commences, please contact our office for a review of all design parameters, including dimensions and equipment requirements. In addition, Trojan is able to provide analytical services to quantify effluent quality and confirm design criteria as required.

Trojan's price for the attached design is **\$135,000** (in US\$). This quoted price includes the equipment as described, freight to site and start-up by qualified personnel. This quote excludes any taxes that may be applicable. The above information is to be used for budget estimates and is valid for 90 days from this day.

Please do not hesitate to call our representative, John Seaman of Heyward Incorporated at 410-726-2960, if you have any questions or would like additional information. Thank you for the opportunity to quote the **Trojan System UV3000™B** on this project.

With best regards,
Trojan Technologies

John Faber

John Faber
Regional Manager
Encl.



DESIGN CRITERIA

Current Peak Design Flow:	1.57 MGD
UV Transmission:	65% (minimum)
Total Suspended Solids:	30 mg/l (30 Day Average)
Max Average Particle Size:	30 microns
Disinfection Limit:	126 E. coli per 100 ml (30 Day Geometric Mean)
Design Dose:	>30 mJ/cm² (independent field bioassay validation)

DESIGN SUMMARY

Based on the above design criteria, the Trojan System UV3000™B proposed consists of:

Number of Channels:	1
Total Number of Banks:	2
Number of Modules per Bank:	6
Number of Lamps per Module:	8
Total Number of Lamps:	96
Number of Power Distribution Centers:	2
Number of System Control Centers:	1
Type of System Control Centers:	Trojan Touch Smart Controller
Number of Level Controllers:	1
Type of Level Controller:	Serpentine Weir
Cleaning System:	Cleaning Rack

EFFLUENT CHANNEL DIMENSIONS

L =	Minimum length required for flow equalization:	26 ft
W =	Channel width based on number of UV modules:	18 in
D =	Maximum depth required for UV Modules access:	48 in

Dimensions are given for reference only. Consult Trojan Technologies for overall system detailed dimensions.

ELECTRICAL REQUIREMENTS

1. The UV System Control Center requires an electrical service of one (1) 120 Volts, 1 phase, 2 wire (plus ground), 12.5 Amps.
2. Each Power Distribution Center requires an electrical service of one (1) 120 Volts, 1 phase, 2 wire (plus ground), 1.9 kVA.

NOTES

- UV Disinfection Equipment specification is available upon request.
- If there are site-specific hydraulic constraints that must be applied, please consult the manufacturer's representative to ensure compatibility with the proposed system.
- Standard spare parts and safety equipment are included with this proposal.
- Electrical disconnects required as per local state code are not included in this proposal.
- Trojan Technologies Inc. warrants all components of the system (excluding UV lamps) against faulty workmanship and materials for a period of 12 months from date of start-up or 18 months after shipment, whichever occurs first.
- Payment Terms: 10% after approved submittal, 80% upon delivery of equipment to site, 10% after equipment acceptance.

Aaron Whitenight

From: Aaron Whitenight
Sent: Thursday, December 1, 2022 1:55 PM
To: Aaron Whitenight
Subject: FW: Millington MD WWTP (p31773-22)

Begin forwarded message:

From: "Kesseli, Richard - Xylem" <richard.kesseli@xylem.com>
Date: November 21, 2022 at 12:06:19 PM MST
To: Dave Kachman <dkachman@kappe-inc.com>
Cc: "Brett, Timothy - Xylem" <Timothy.Brett@xylem.com>
Subject: RE: Millington MD WWTP (p31773-22)

Hi Dave,

Please find the attached design summaries, process description, and scopes below for Millington, MD. In order to meet a TN < 3 and TP < 0.3 consistently we are recommending tertiary filters. The loading assumed was based on the concentrations provide applied to the design flows requested (Scn #1: 0.35 MGD and Scn #2: 0.6 MGD). If the loads assumed and design layout are acceptable we can validate the design with Biowin.

We are proposing an anaerobic tank for biological phosphorus removal as this will reduce the amount of metal salt required. We are also including a mixer and aeration grid in the first aerobic zone so it may act as an aerated anoxic (SNDN operation) or pre-anoxic zone (4-stage Bardenpho operation). We would recommend operating as SNDN during design loads with the ability to operate as a 4-stage bardenpho at loads less than design. This design is similar to the Elkton, VA plant that will start up next spring and the La Plata, MD plant Sanitaire recently won.

Our state point analysis is coming up with (2) 40' diameter clarifiers required to handle both Scn #1 and Scn #2 peak flows.

Bio-P Scenario #1 - 0.35 MGD. Two Trains each with (1) 84' x 12' x 16' SWD tank consisting of (1) 10' L Anaerobic Tank and (3) 23.67' L Aerobic Zones, followed by a 12' x 12' x 16' SWD Post-Anoxic zone and 4' x 12' x 16' SWD Re-Aeration zone.

1. (2) 15HP PD Blowers w/ sound enclosures(1 duty + 1 standby)
2. (8) Sanitaire Fine Bubble Aeration Grids (1 per Aerobic Zones 1-3 and Re-aeration)
3. (6) Socket Mixer Hoist (1 per anaerobic, pre-anoxic and post-anoxic tank)
4. (6) Flygt 4620 Compact Mixer (1 per anaerobic, Pre-anoxic and Re-aeration tank)
5. (2) Flygt PP4630 Propeller pumps (1 Duty + 1 Standby)
6. (2) Flygt NP3069 WAS Pumps (1 Duty + 1 Standby)
7. (2) Flygt NP3069 RAS Pumps (1 Duty + 1 Standby)
8. (6) 4" Modulating Plug Valves (1 per Aerobic Zones 2-3 and Re-aeration)
9. (2) ORP Probes (1 per pre-anoxic zone)
10. (6) DO Probes (1 per Aerobic Zones 1-3 and Re-aeration)
11. (1) Pressure Transmitter

12. (8) Air Flow Meters
13. (1) OSCAR Package, including the following features
 1. Main Control Panel with HMI (Does not include motor starts, VFDs, or MCC)
 2. DO Control
 3. Remote HMI Accessibility
14. (15) Days Service – Including Commissioning and Process Training

Budget: \$760,000 includes freight to site and standard 1-year warranty

Scenario #2 - 0.60 MGD. Two additional Trains each with (1) 84' x 12' x 16' SWD tank consisting of (1) 10' L Anaerobic Tank and (3) 23.67' L Aerobic Zones, followed by a 12' x 12' x 16' SWD Post-Anoxic zone and 4' x 12' x 16' SWD Re-Aeration zone.

15. (1) 15HP PD Blowers w/ sound enclosures(1 duty)
16. (8) Sanitaire Fine Bubble Aeration Grids (1 per Aerobic Zones 1-3 and Re-aeration)
17. (6) Socket Mixer Hoist (1 per anaerobic, pre-anoxic and post-anoxic tank)
18. (2) Flygt 4630 Compact Mixers (1 per pre-anoxic tank)
19. (2) Flygt 4620 Compact Mixer (Re-aeration tank)
20. (1) Flygt PP4630 Propeller Pump
21. (1) Flygt NP3069 RAS Pump
22. (8) 4" Modulating Plug Valves (1 per Aerobic Zones 1-3 and Re-aeration)
23. (2) ORP Probes (1 per pre-anoxic zone)
24. (6) DO Probes (1 per Aerobic Zones 1-3 and Re-aeration)
25. (1) Pressure Transmitter
26. (8) Air Flow Meters
27. (10) Days Service – Including Commissioning and Process Training

Budget: \$545,000 includes freight to site and standard 1-year warranty

Thank you,
Richie



How are we doing?

RICHARD KESSELI

Application Engineer – Sanitaire NE
O: 704.409.9746
M: 980.219.9870
4828 Parkway Plaza Blvd., Suite 200
Charlotte, NC 28217

Richard.Kesseli@xylem.com

[LEAVE FEEDBACK](#)

From: Dave Kachman <dkachman@kappe-inc.com>
Sent: Sunday, November 20, 2022 11:00 AM
To: Kesseli, Richard - Xylem <richard.kesseli@xylem.com>
Cc: Brett, Timothy - Xylem <Timothy.Brett@xylem.com>
Subject: Re: Millington MD WWTP (p31773-22)

Hi Rich,

Reminder per our conversation on Friday to update Monday or Tuesday next week.

Thanks !!

Respectfully,

Dave Kachman, CEO

Kappe Associates, Inc.
100 Wormans Mill court
Frederick, MD 21701
Phone (301) 846-0200
Cell (301) 788-7132

WWW.kappe-inc.com



CASPERON Process with OSCAR™ process performance optimizer – 4- Stage Bardenpho / SNDN Process

PROCESS DESCRIPTION

**For:
Millington, MD WWTP**

***Sanitaire Representative:
Kappe Associates, Inc.***



November 21, 2022

To: KCI Technologies, Inc.

Xylem is pleased to present a comprehensive wastewater treatment process solution by providing an integrated mechanical and electrical system that optimizes biological process performance. Plant operation is the largest life-cycle cost component for a wastewater treatment facility. An integrated and well-engineered control system for your specific requirements is critical for efficient, long-term plant operation, process control, and management. The proposed CASPERON process combines Sanitaire fine bubble diffused aeration and Flygt mixers, coupled with OSCAR™ biological process controls and YSI instrumentation to deliver an energy-efficient process solution that is fully automatic and simple to operate. Our offerings leverage Xylem's unique understanding of aeration, mixing, and liquid-solids separation to provide the most efficient system available.

Features and benefits of our solution include:

Proven Solution with Single Supplier Responsibility

- Industry-leading products deliver a reliable solution you can trust.

Low Maintenance/Ease of Operation

- Sanitaire fine bubble diffused aeration equipment is robust, long-lasting, and resistant to clogging.
- Flygt submersible mixers prevent sludge accumulation.
- The OSCAR® process performance optimizer control system provides real-time monitoring of DO and ORP so operators always have the information they need. Automation allows operators to enter setpoints and let the OSCAR® system do the rest.

Minimum Energy Consumption

- The most efficient aeration control system available—high efficiency Sanitaire Silver Series II membrane diffusers coupled with OSCAR™ process control employs proprietary ORP and DO control to offer substantial energy savings compared with conventional systems.

Biological Nutrient Removal Process Design

- The 4-Stage Bardenpho / SNDN process proposed is designed to oxidize BOD and ammonia, denitrify the wastewater to remove nitrates, and remove phosphorus biologically* and with chemical precipitation (*An alternative design is proposed with anaerobic tanks for Bio-P removal). The proposed design reduces energy consumption relative to other alternatives, and addresses effluent requirements for ammonia nitrogen, total nitrogen, and phosphorus removal.

A. PROCESS DESIGN

I. SNDN Process Description

Xylem utilized an empirical model to evaluate the treatment performance of the subject project. Influent characterization, including influent condition and corresponding effluent quality requirements are defined in the attached sizing calculations.

In the SNDN process, an anaerobic zone* and 3 aerated reactors will be operated in series, followed by clarifiers for solid-liquid separation. The oxygen supply rate to the initial aerated reactors, which with a higher F:M ratio, will be controlled rate so that the oxygen is quickly consumed (called an aerated-anoxic condition). This first aerated reactor will also include a submersible mixer so that it may act as a pre-anoxic tank for 4-stage bardenpho operation at low flow and loads. The aerated reactors at the back end of the process will be maintained in an aerobic state and will remove any residual ammonia, but the majority of the ammonia will be converted to nitrate in the upstream aerated anoxic reactors.

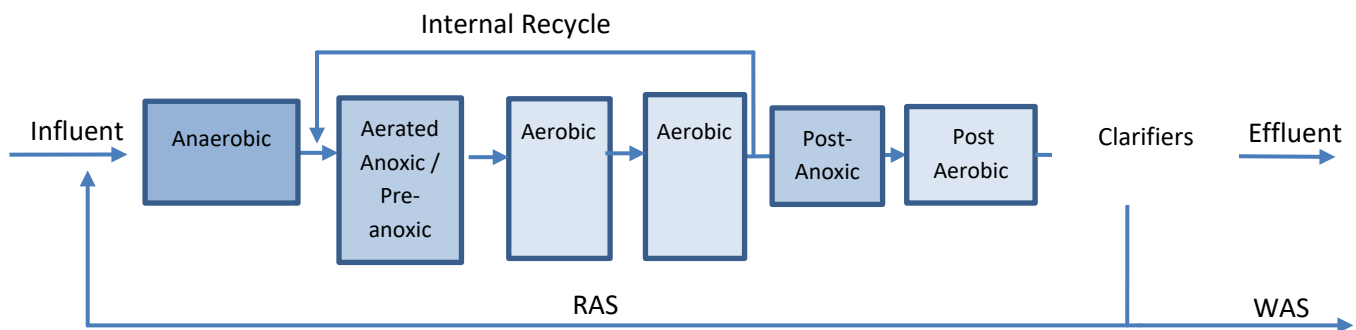
Anaerobic conditions in the first reactor promote biological phosphorus removal by supporting the selection of phosphorus accumulating organisms (PAOs). Anaerobic conditions also enhance hydrolysis of slowly biodegradable substrates to readily biodegradable substrates. The presence of PAOs provides excess phosphorus removal by elevating the phosphorus uptake of the biomass in excess to that required for cell growth. The anaerobic conditions, combined with readily available biodegradable substrate, promote the release of

phosphorus into solution. The phosphorus rich solution, combined with an aerobic environment and PAOs, results in an uptake of the phosphorus previously released in the anaerobic zone as well as additional phosphorus uptake commonly referred to as luxury uptake. Phosphorus is ultimately removed from the system through sludge wasting. Denitrification concludes the nitrogen removal process by converting nitrate from the nitrification step to nitrogen gas which is released to the atmosphere. Denitrification occurs under anoxic conditions, relying on heterotrophic bacteria and readily available biodegradable substrate. Since the initial reactor(s) (is)(are) maintained in an aerated anoxic state, bacteria in the initial reactor(s) can chemically bind the oxygen in nitrate to reduce readily available biodegradable substrate.

Since nitrate used for denitrification in the anoxic zone is produced as a result of the nitrification in the aerobic zone, nitrate-rich water from the aerobic zone is recycled to the anoxic zone by the use of an internal recycle line.

SNDN has been documented by several independent researchers¹²³⁴ as an energy-efficient method of total nitrogen removal. This process has also been successfully demonstrated at full-scale wastewater plants with fine bubble diffused aeration (FBDA), including the Sanitaire oxidation ditch in Tifton, GA and the fine bubble diffused aeration plant in Muncie, IN. The challenge for maintaining Aerated Anoxic with FBDA has been the need to limit the oxygen supply rate during low temperatures and/or low influent load while maintaining mixing. Sanitaire addresses this need with the VEMA controller, which intermittently pulses the air supply rate to the aeration grids to maintain mixed liquor solids in suspension while operating most of the time at lower airflow rates.

The discharge from the post-anoxic zone flows to the post-aerobic zone and finally to the clarifiers. Return activated sludge (RAS) flows from the clarifiers to the beginning of the biological process (anaerobic zone) to ensure that a healthy biomass is maintained in the biological basins. The excess sludge produced, the waste activated sludge (WAS), is taken out of the system to maintain a stable sludge mass (i.e., SRT). The schematic below shows the general process layout.



REDUNDANCY

To allow maintenance, the **CASPERON** system can also treat 50% of the design average annual mass load with any one of the aerated reactors out of service. With the blowers supplying air to the diffuser grids in a common manifold, it is easy to increase the aeration rate to the remaining tanks when a basin is taken off-line.

Contact Stabilization/Step-Feed

Another benefit of operating multiple reactors in series during normal operation is that all or a fraction of the influent can be diverted to the downstream ditch during a peak flow event and/or a plant upset that impairs settling (step-feed or contact stabilization mode). This allows higher MLSS concentrations and/or higher SVI conditions to be tolerated without oversizing the secondary clarifiers, while maintaining good effluent quality throughout the peak flow or plant upset event. The switch from the normal operating mode to step-feed or contact stabilization can be accomplished with adjustable weir gates in a splitter box. This technique for handling peak flows has been demonstrated at hundreds of wastewater plants across the United States.

¹ Littleton, Daigger, Strom, Mechanisms of Simultaneous Biological Nutrient Removal in Closed Loop Reactors, WEFTEC 2003

² Barnard, Dunlap, Steichen, Utilizing Simultaneous Nitrification and Denitrification in BNR Plants to the Maximum Effect, WEFTEC 2013

³ Jimenez, Simultaneous Nitrification-Denitrification to Meet Low Effluent Nitrogen Limits, VWEA 2012

⁴ Fitzgerald, Noguera, Camejo, Ammonia-oxidizing microbial communities in reactors with efficient nitrification at low-dissolved oxygen, Water Research – Dec 2014

CASPERON™ Design Proposal - SNDN Process
 Millington, MD - Scn#1 - Bio-P Sanitaire #p31773-22

INFLUENT WASTEWATER CHARACTERISTICS AND SITE CONDITIONS

Number of Parallel Biological Trains	2	
	Per Biological Train	Total all Bio. trains
Average Annual Flow	0.18 MGD	0.35 MGD
Maximum Month Influent Flow	0.18 MGD	0.35 MGD
Peak Hourly Flow	0.67 MGD	1.33 MGD
BOD ₅ (20°C)	200 mg/l	
BOD ₅ (20°C)	292 lb/d	
Suspended Solids	250 mg/l	
TKN	40 mg/l	
Total Phosphorus	11 mg/l	
Max Wastewater Temperature	20 °C	
Min Wastewater Temperature	12 °C	
Ambient Air Temperature	20 - 90 °F	
Site Elevation	20 ft	

CASPERON™ SNDN PROCESS EFFLUENT QUALITY (MONTHLY AVERAGE)

BOD ₅ (20°C)	5.0 mg/l
Suspended Solids	5.0 mg/l
NH ₃ -N	1.0 mg/l
TN	3.0 mg/l
Total Phosphorus*	0.3 mg/l

*Requires chemical precipitation

CASPERON™ SNDN PROCESS DESIGN CRITERIA

F / M	0.078 lb BOD ₅ / lb MLSS / day
SVI (after 30 minutes settling)	150 ml/g
Biological Mixed Liquor Suspended Solids (MLSS) conc.	4,400 mg/l
Waste Sludge Produced (Approx.)	352 lb/d
Volume of Sludge Produced (Approx. 0.88% solids)	4,794 gpd
Aerated Hydraulic Retention Time	13.99 Hrs
Sludge Age	10.6 Days
Sufficient Alkalinity must be provided to maintain basin pH of 6.8	
Chemical dosage (as Alum)	113 mg/l
RAS Pumping Rate	100% of Maximum Month Flow
MLR Pumping Rate	300% of Maximum Month Flow

CASPERON™ SNDN PROCESS BASIN DESIGN DETAILS (PER TRAIN)

	Anaerobic	Aerated Reactors Operated in Series			Post Anoxic	Post-aerobic Basins
		Aeration 1	Aeration 2	Aeration 3		
Basin Quantity	1	1	1	1	1	1
Volume/Basin (MG)	0.014	0.034	0.034	0.034	0.017	0.006
Basin Length (ft)	10.0	23.67	23.67	23.67	12.0	4.0
Basin Width (ft)	12.0	12.0	12.0	12.0	12.0	12.0
Basin Depth (ft)	16.0	16.0	16.0	16.0	16.0	16.0

CASPERON™ SNDN PROCESS EQUIPMENT

	Anaerobic	Aerated Reactors Operated in Series			Post Anoxic	Post-aerobic Basins
		Aeration 1	Aeration 2	Aeration 3		
Mixer Quantity/Basin	1	1			1	
Mixer Motor Hp	2.3	2.3			2.3	
Fine Bubble Diffuser Quantity / Basin / Train		24	24	24		6
Biological blower (scfm/basin/train)		28	29	36		6

Biological Blowers (PD type) 1 Duty + 1 Standby with 15 Hp Motor

MLR Pumps 1 Duty + 1 Standby with 2.5 Hp Motor

RAS Pumps 1 Duty + 1 Standby with 2.4 Hp Motor

WAS Pumps 1 Duty + 1 Standby with 2.4 Hp Motor

OSCAR Control Panel

Instruments and Valves in Basins					Quantity
Location	Aeration 1	Aeration 2	Aeration 3	Post-aerobic	
ORP probe	Yes				2
DO probe		Yes	Yes	Yes	6
Air modulating valve	1@4 inch	1@4 inch	1@4 inch	4 inch	6
Airflow meter	1@4 inch	1@4 inch	1@4 inch	4 inch	6
Other Instruments and Valves					
Location	Size				
Air pressure transmitter Bio Blower Discharge					1

CASPERON™ SNDN AERATION/MIXING POWER REQUIREMENTS (TOTAL FOR ALL TRAINS)

	Anaerobic	Aerated Reactors Operated in Series			Post Anoxic	kW-hr/d
		Aeration 1	Aeration 2	Aeration 3		
Basin Quantity	2	2	2	2	2	
Mixers / Basin	1	1			1	
Mixer Op. Hp	1.8	2.3			1.8	214
Bio Blowers Operating Power	1	at	10.6 Hp			190
MLR Pump Operating Power	1	at	1.26 Hp			23
WAS Pump Operating Power	1	at	2.2 Hp for		4% of time	2
RAS Pump Operating Power	1	at	1.7 Hp			30

Total kW-hr/d 458

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#1 - Bio-P**
 Project Number: **p31773-22**

Designer: **RVK**
 Date: **11/10/2022**

Design Parameters

Number of Parallel Process Trains 2

Flow

	Per process train	Total for all trains
Average Annual Flow	0.18 MGD	0.35 MGD
Maximum Month Flow	0.18 MGD	0.35 MGD
Peak Hourly Flow	0.67 MGD	1.33 MGD

Treatment

	Units	Influent Quality	Effluent Requirement
BOD ₅ (20°C)	mg/l	200	5
Suspended Solids	mg/l	250	5
TKN	mg/l	40	N/A
NH ₃ -N	mg/l	N/A	1.0
TN	mg/l	N/A	3
Phosphorus	mg/l	11.0	0.3

Environment

Sufficient Alkalinity must be provided to maintain basin pH of 6.8

Max. Wastewater Temperature	20	°C
Min. Wastewater Temperature	12	°C
Ambient Air Temperature	20 - 90	°F
Site Elevation	20	ft

Activated Sludge Solution Design Parameters

F / M	0.08	lb BOD ₅ / lb MLSS / day
Aerated HRT	13.99	hrs
SVI (after 30 minutes settling)	150	ml/g
Number of Aerated Reactors in Series	3	
Water Depth	16.0	ft
RAS Pumping Rate	100%	of Maximum Month Flow
MLR Pumping Rate	300%	of Maximum Month Flow

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#1 - Bio-P**Designer: **RVK**Project Number: **p31773-22**Date: **11/10/2022****Process Calculations****Nitrification Kinetics**

Refer to Metcalf and Eddy, Edition IV pages 614 and 705

Constants and Temperature Corrections:

Coefficient	Base Value	Theta	Temperature Corrected	Symbol
Maximum Specific Growth Rate of Nitrifying bacteria, g/ VSS/g VSS•day	0.75	1.07	0.43651	$\mu_{nm}(T)$
Half-Velocity constant for nitrifiers	0.74	1.053	0.48956	$K_n(T)$
Nitrifier decay rate	0.08	1.04	0.05846	$K_{dn}(T)$
Dissolved Oxygen in final reactor	2.00		2.00	DO
Half-Velocity Constant for Dissolved Oxygen, mg/l	0.5		0.5	K_o
Minimum Water Temperature, °C	12		12	T
Safety Factor	1.9		1.9	SF

Calculations

$$\mu_n = \left(\mu_{nm}(T) \times \frac{TENH_3}{TENH_3 + K_n(T)} \times \frac{DO}{DO + K_o} \right) - K_{dn}(T)$$

$$\mu_n = \left(0.437 \times \frac{1.0}{1.0 + 0.49} \times \frac{2}{2.0 + 0.5} \right) - 0.058 = 0.18 \text{ days}^{-1}$$

$$SRT_{min} = \frac{1}{\mu_n} = \frac{1}{0.18} = 5.7 \text{ days}^{-1}$$

$$SRT_{aerobic} = SRT_{min} \times SF = 5.7 \times 1.9 = \mathbf{10.6 \text{ days}}$$

Where: $\mu_{nm}(T)$ = Maximum Temperature Corrected Nitrifier Growth Rate (days^{-1}) μ_n = Specific Nitrifier Growth rate at Temperature, DO, and Effluent NH_3 (days^{-1})

SRTmin = Minimum Sludge age required for Nitrification (days)

SRTaerobic = Design Aerobic Sludge Age (days)

SF = Safety Factor

TENH3 = Anticipated Effluent Ammonia (mg/l)

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#1 - Bio-P**Designer: **RVK**Project Number: **p31773-22**Date: **11/10/2022****Sludge Yield**

Refer to WEF MOP/8 4th Edition, pg 11-11, Eqn 11.7

$$\Delta M = \left(\frac{Y \times (\text{BODin} - \text{BODout})}{1 + (B \times \theta^{(T-20)}) \times \text{SRT}} + \text{Zio} + \text{Zno} \right) \times Q \times 8.34 + \text{CS}$$

$$\Delta M = \left(\left(\frac{0.6 \times (200 - 5)}{1 + (0.07 \times 1.04^{(12-20)}) \times 10.6d} + 50.0 + 75.0 \right) \times 0.18 \times 8.34 \right) + 59 = 352 \text{ lb/day}$$

where: ΔM = Mass of Sludge Produced (lb/day)

Y = Volatile Cell Yield (VSS/BOD Removed)

 θ = Arrhenius Temperature Correction FactorB = Decay Rate (day^{-1})

BODout = Anticipated Effluent BOD (mg/l)

SRT = Solids Retention Time (days)

Zio = Influent Nonvolatile Suspended Solids (mg/l)

Zno = Influent Volatile Nonbiodegradable Solids (mg/l)

Q = Maximum month flow, MGD

T = Minimum Wastewater Temperature ($^{\circ}\text{C}$)

CS = Chemical Sludge from Phosphorus Precipitation with Alum (lb/day)

(see chemical sludge production calculations below)

$$\text{BODL} = \frac{Q \times \text{BOD} \times 8.34}{1,000,000} = \frac{0.180 \times 200 \times 8.34}{1,000,000} = 292 \text{ lb/day}$$

where: Q = Max month flow, MGD

BOD = BOD concentration, mg/l

$$\text{Sludge Yield, } Y_s = \Delta M / \text{BOBL} = 352 / 292 = 1.21$$

Chemical Dosing

Initial estimate of phosphorus in WAS, based on assumed % of MLVSS as P

$$\text{Pw} = (\text{BODin} - \text{BODout}) \times Y_s \times \text{MLVSS} \times \text{Psa} = (200 - 5) \times 1.21 \times 0.63 \times 0.045 = 6.6 \text{ mg/l}$$

Where: Pw = Phosphorus removed with WAS, mg/l as P

BODin = Influent BOD, mg/l

BODout = Anticipated Effluent BOD (mg/l)

MLVSS = Mixed Liquor Volatile Suspended Solids Concentration

Psa = Assumed % of MLVSS as P

Based on Assumed % of MLSS, estimate phosphorus concentration to be removed with metal salt

$$\text{Pmb} = \text{Tpi} - \text{Pw} - \text{Pe} = 11.00 - 6.60 - 0.30 = 4.08 \text{ mg/l}$$

Where: Pmb = Phosphorus concentration to be removed with metal salt, mg/l

Tpi = Influent Phosphorus concentration, mg/l

$$\text{CD} = \text{MoIR} \times \text{Pmb} / \text{Ion} \times \text{MWRatio} =$$

Where: CD = Required Alum dosing rate, mg/l

MoIR = Mole Ratio (Actual Dose required vs. Stoichiometric Dose)

Ion = Fraction Metal Ion in Alum

MWRatio = Ratio of Molecular Weights, Al:P

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#1 - Bio-P**Designer: **RVK**Project Number: **p31773-22**Date: **11/10/2022****Mass of Chemical Sludge**

$$CS = Q \times Pmb \times MP \times 8.34 = 0.18 \times 4.08 \times 10.45 \times 8.34 = 62 \text{ lb/d/train}$$

Where: MP = Mass of Precipitate formed per Mass of P removed

Aerated Process Volume

$$Vaer_design = \frac{\Delta M \times SRT}{MLSS \times 8.34} = \frac{352 \times 10.6}{4,400 \times 8.34} = \mathbf{0.102 \text{ MG}}$$

where: Vaer_design = Volume of Aeration Tank, MG

MLSS = Aeration Tank Mixed Liquor Suspended Solids Concentration, mg/l

Reactor	Actual volume		
Aeration 1	0.034 MG		
Aeration 2	0.034 MG		
Aeration 3	0.034 MG		
Total	0.102 MG		

Anaerobic Process Volume

Size Anaerobic Zone based on 2.0 hour hydraulic detention time at Max. Mo. Flow

Required Volume = MMF x HDT / 24 = 14362 gallons

Anoxic Process Volume

Operate first 2 aerated reactors as aerated anoxic for aerated anoxic vol. = 67,988 gallons

For assumed denitrification rates listed below, required post-anoxic volume = 17,234 gallons

Total anoxic process volume = 85,222

Re-Aeration Process Volume

Size re-aeration zone based on 47.3 minute hydraulic detention time at Max. Mo. Flow

Required Volume = MMF x HDT / 24 = 5745 gallons

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#1 - Bio-P**
 Project Number: **p31773-22**

Designer: **RVK**
 Date: **11/10/2022**

Nitrogen Balance

Constants

Coefficient	Value	Symbol
VSS/TSS	62.5%	
Sludge N	0.063	Ns
Effluent Dissolved Organic Nitrogen, mg/l	1.0	EDON

$$\text{TKN}_{\text{ox}} = \text{TKN} - \text{EDON} - \text{TENH3} - \text{N}_{\text{assim}} - \text{N}_{\text{part}} = 40.0 - 1.0 - 1 - 15.1 - 0.20 = \mathbf{22.6 \text{ mg/l}}$$

where: TKN_{ox} = TKN available for oxidation (mg/l)

TKN = Influent TKN (mg/l)

TENH3 = Effluent $\text{NH}_3\text{-N}$ (mg/l)

N_{assim} = Nitrogen assimilated into sludge (mg/l)

N_{part} = Nitrogen bound to VSS portion of effluent TSS (mg/l)

$$\text{N}_{\text{assim}} = \frac{\Delta M \times \text{Ns}}{Q \times 8.34} = \frac{352 \times 0.06}{0.18 \times 8.34} = 15.1 \text{ mg/l}$$

$$\text{N}_{\text{part}} = \text{TESS} \times \text{Ns} \times \text{VSS/TSS} = 5 \times 0.06 \times 0.63 = \mathbf{0.20 \text{ mg/l}}$$

where TESS = Effluent Total Suspended Solids (mg/l)

$$\text{TENoxN} = \text{TKN}_{\text{ox}} \times (1 - \text{Denite}\%) = 22.6 \times (1 - 1) = 0$$

where: TENox = Total effluent nitrate + nitrite nitrogen (mg/l)

Denite % = Predicted denitrification %, based on Anoxic Process Volume and SNDR

SNDR = See Assumed Denitrification Rates in table below

$$\text{TN} = \text{TENH3} + \text{TENox} + \text{EDON} + \text{Npart} = 1 + 0 + 1 + 0.20 = 2.2$$

where: TN = Effluent Total Nitrogen (mg/l)

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#1 - Bio-P**Designer: **RVK**Project Number: **p31773-22**Date: **11/10/2022****Assumed Denitrification Rates**

Check Assumed Denite Rate in each Zone

Reactor	1	2	3	Post-Anoxic
Description	Aeration	Aeration	Aeration	
NO3-N mass to remove	19.03	6.833	0	3.67 lb/d
Mass of MLVSS	780	780	780	396 lb
Required Denite Rate (SNDR)	0.0244	0.0088	0.0000	0.0093 mass NO3-N/mass MLVSS/d
Theoretical Denite Rate at 20C	0.06	0.06	0.06	0.045 mass NO3-N/mass MLVSS/d
DO Switch Function	1	0.5	0.091	1 At design DO concentration
Temperature Correction	0.54	0.54	0.54	0.54 At design water temperature
Adjusted Theoretical Denite Rate	0.032	0.016	0.003	0.024 mass NO3-N/mass MLVSS/d
Assumed Denite rate OK?	YES	YES	YES	YES

Actual Oxygen Demand

$$AOR_T = AOR_C + AOR_N = 350 + 57 = \mathbf{408 \text{ lb/day}}$$

where: AOR_T = Total Actual Oxygen Demand, lb/day AOR_C = Carbonaceous Oxygen Demand, lb/day AOR_N = Nitrogen Oxygen Demand (Including any denitrification credit), lb/day**Carbonaceous Oxygen Demand**

$$AOR_C = BOD_L \times O_{2carb} = 292 \times 1.2 = \mathbf{350 \text{ lb/day}}$$

where: O_{2carb} = O_2/BOD

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#1 - Bio-P**Designer: **RVK**Project Number: **p31773-22**Date: **11/10/2022****Nitrogen Oxygen Demand**

$$AOR_N = TKN_{ox(Mass)} \times 4.6 - DNC = 33 \times 4.6 - 94 = \mathbf{57 \text{ lb/day}}$$

where: 4.6 = O₂/NH₃

DNC = Denitrification Credit

$$TKN_{ox(Mass)} = TKN_{ox} \times Q = 22.6 \times 0.18 \times 8.34 = 33 \text{ lb/day}$$

$$DNC = NO_3\text{-N}_{removed} \times Q \times 2.86 \times DN \times 8.34 = 22.6 \times 0.18 \times 2.86 \times 1 \times 8.34 = 94 \text{ lb/day}$$

where: DN = Fraction NO₃-N_{removed} used to calculate denitrification credit = 100%

Based on 100% denitrification in SNDN process

NO₃-N_{removed} = 22.6 mg/l**Standard Oxygen Demand**

$$SOR = \frac{AOR}{AOR/SOR} = \mathbf{713 \text{ lb/day}}$$

where: SOR = Standard Condition Oxygen Transfer (20°C, 1 atm, α = β = 1), lb/day

AOR / SOR = Conversion Factor Actual to Standard condition oxygen

$$\frac{AOR}{SOR} = \frac{\alpha \times \theta^{(T_{site} - 20)} (C^*_{sat20} \times \beta \times P_{site} / P_{std} \times C_T / C_{20} - DO)}{C^*_{sat20}}$$

where: α = Alpha factor = 0.6

θ = Temperature coefficient = 1.024

T_{site} = Water temperature, °C = 20

β = Beta factor = 0.98

P_{site} = Site Atmospheric PressureP_{std} = Standard atmospheric pressure, psiaC*_{sat20} = Dissolved oxygen solubility at standard conditions, mg/lC_T = Dissolved oxygen solubility at site water temperature, mg/lC₂₀ = Dissolved oxygen solubility at 20°C, mg/l

DO = Residual dissolved oxygen concentration, mg/l

Aeration Design

Reactor	1	2	3	Total
DO, mg/l	0.0	0.2	2	
AOR, lb/d	129	129	129	386
AOR/SOR	0.588	0.576	0.475	
SOR	219	223	271	713

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#1 - Bio-P**

Designer: **RVK**

Project Number: **p31773-22**

Date: **11/10/2022**

Clarifier Sizing

$$A_{\text{design, Max Mo}} = Q_{\text{avg}} / O_{\text{avg}} / \text{No. Clarifiers} = 350,000 / 138.9 / 2 = 1260 \text{ ft}^2$$

$$A_{\text{design, Peak}} = Q_{\text{avg}} / O_{\text{avg}} / \text{No. Clarifiers} = 1,330,000 / 527.8 / 2 = 1260 \text{ ft}^2$$

where: Q = Flow, gpd

A = Area per clarifier, ft²

O = Surface overflow rate, gpd/ft²

Use Larger Area = 1260 ft²

Dia. design $[\text{Area} / \pi \times 4]^{(1/2)} = [1260 / 3.142 \times 4]^{(1/2)} = 40 \text{ ft}$

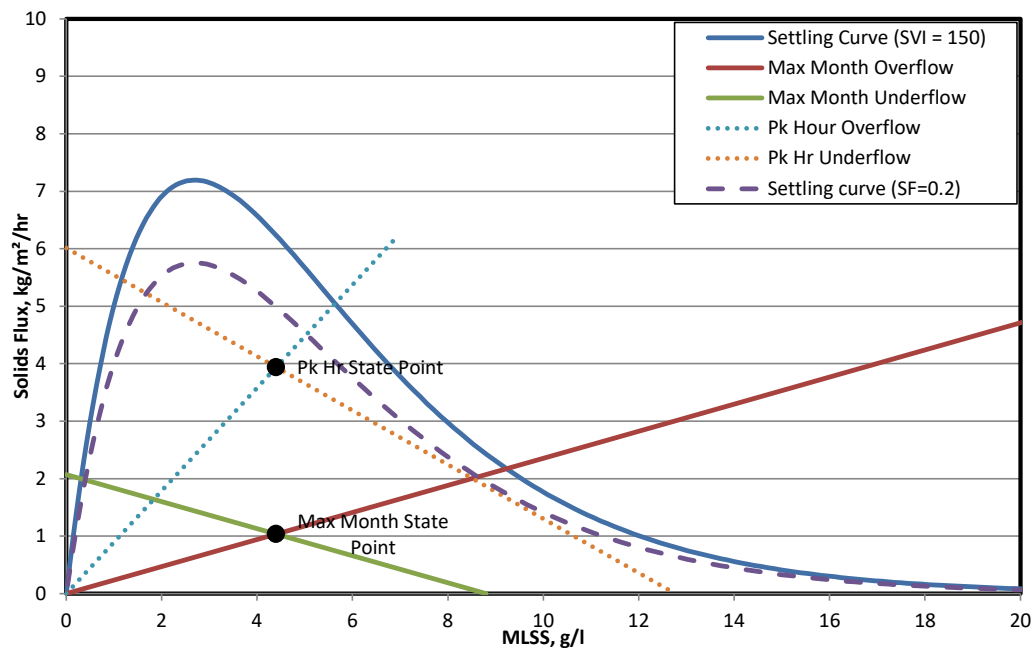
Use Clarifier Diameter = 40 ft

User Clarifier Quantity = 2

Max. Mo. Condition = 4,400 mg/l MLSS and 8,800 mg/l RAS concentration

Peak Condition = 4,400 mg/l MLSS and 12,760 mg/l RAS concentration

State Point Analysis



Max Month State Point is below the settling curve.

Pk Hr State Point is below the settling curve.

Pk Hr Underflow underflow is below the settling curve.

Clarifier design is adequate.

CASPERON™ Design Proposal - SNDN Process
 Millington, MD - Scn#2 - Bio-P Sanitaire #p31773-22

INFLUENT WASTEWATER CHARACTERISTICS AND SITE CONDITIONS

Number of Parallel Biological Trains	4	
	Per Biological Train	Total all Bio. trains
Average Annual Flow	0.15 MGD	0.60 MGD
Maximum Month Influent Flow	0.15 MGD	0.60 MGD
Peak Hourly Flow	0.52 MGD	2.09 MGD
BOD ₅ (20°C)	200 mg/l	
BOD ₅ (20°C)	250 lb/d	
Suspended Solids	250 mg/l	
TKN	40 mg/l	
Total Phosphorus	11 mg/l	
Max Wastewater Temperature	20 °C	
Min Wastewater Temperature	12 °C	
Ambient Air Temperature	20 - 90 °F	
Site Elevation	20 ft	

CASPERON™ SNDN PROCESS EFFLUENT QUALITY (MONTHLY AVERAGE)

BOD ₅ (20°C)	5.0 mg/l
Suspended Solids	5.0 mg/l
NH ₃ -N	1.0 mg/l
TN	3.0 mg/l
Total Phosphorus*	0.3 mg/l

*Requires chemical precipitation

CASPERON™ SNDN PROCESS DESIGN CRITERIA

F / M	0.077 lb BOD ₅ / lb MLSS / day
SVI (after 30 minutes settling)	150 ml/g
Biological Mixed Liquor Suspended Solids (MLSS) conc.	3,800 mg/l
Waste Sludge Produced (Approx.)	301 lb/d
Volume of Sludge Produced (Approx. 0.76% solids)	4,756 gpd
Aerated Hydraulic Retention Time	16.32 Hrs
Sludge Age	10.7 Days
Sufficient Alkalinity must be provided to maintain basin pH of 6.8	
Chemical dosage (as Alum)	114 mg/l
RAS Pumping Rate	100% of Maximum Month Flow
MLR Pumping Rate	200% of Maximum Month Flow

CASPERON™ SNDN PROCESS BASIN DESIGN DETAILS (PER TRAIN)

	Anaerobic	Aerated Reactors Operated in Series			Post Anoxic	Post-aerobic Basins
		Aeration 1	Aeration 2	Aeration 3		
Basin Quantity	1	1	1	1	1	1
Volume/Basin (MG)	0.014	0.034	0.034	0.034	0.017	0.006
Basin Length (ft)	10.0	23.67	23.67	23.67	12.0	4.0
Basin Width (ft)	12.0	12.0	12.0	12.0	12.0	12.0
Basin Depth (ft)	16.0	16.0	16.0	16.0	16.0	16.0

CASPERON™ SNDN PROCESS EQUIPMENT

	Anaerobic	Aerated Reactors Operated in Series			Post Anoxic	Post-aerobic Basins
		Aeration 1	Aeration 2	Aeration 3		
Mixer Quantity/Basin	1	1			1	
Mixer Motor Hp	2.3	2.3			2.3	
Fine Bubble Diffuser Quantity / Basin / Train		24	24	24		6
Biological blower (scfm/basin/train)		24	24	30		5

Biological Blowers (PD type) 2 Duty + 1 Standby with 15 Hp Motor

MLR Pumps 2 Duty + 1 Standby with 2.5 Hp Motor

RAS Pumps 2 Duty + 1 Standby with 2.4 Hp Motor

WAS Pumps 1 Duty + 1 Standby with 2.4 Hp Motor

OSCAR Control Panel

Instruments and Valves in Basins					Quantity
Location	Aeration 1	Aeration 2	Aeration 3	Post-aerobic	
ORP probe	Yes				4
DO probe		Yes	Yes	Yes	12
Air modulating valve	1@4 inch	1@4 inch	1@4 inch	4 inch	12
Airflow meter	1@4 inch	1@4 inch	1@4 inch	4 inch	12
Other Instruments and Valves					
Location	Size				
Air pressure transmitter Bio Blower Discharge					1

CASPERON™ SNDN AERATION/MIXING POWER REQUIREMENTS (TOTAL FOR ALL TRAINS)

	Anaerobic	Aerated Reactors Operated in Series			Post Anoxic	kW-hr/d
		Aeration 1	Aeration 2	Aeration 3		
Basin Quantity	4	4	4	4	4	
Mixers / Basin	1	1			1	
Mixer Op. Hp	1.8	2.3			1.8	427
Bio Blowers Operating Power	2	at	10.4 Hp			372
MLR Pump Operating Power	2	at	2.01 Hp			72
WAS Pump Operating Power	1	at	2.2 Hp for		4% of time	2
RAS Pump Operating Power	2	at	1.7 Hp			62

Total kW-hr/d 935

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#2 - Bio-P**
 Project Number: **p31773-22**

Designer: **RVK**
 Date: **11/10/2022**

Design Parameters

Number of Parallel Process Trains 4

Flow

	Per process train	Total for all trains
Average Annual Flow	0.15 MGD	0.60 MGD
Maximum Month Flow	0.15 MGD	0.60 MGD
Peak Hourly Flow	0.52 MGD	2.09 MGD

Treatment

	Units	Influent Quality	Effluent Requirement
BOD ₅ (20°C)	mg/l	200	5
Suspended Solids	mg/l	250	5
TKN	mg/l	40	N/A
NH ₃ -N	mg/l	N/A	1.0
TN	mg/l	N/A	3
Phosphorus	mg/l	11.0	0.3

Environment

Sufficient Alkalinity must be provided to maintain basin pH of 6.8

Max. Wastewater Temperature	20	°C
Min. Wastewater Temperature	12	°C
Ambient Air Temperature	20 - 90	°F
Site Elevation	20	ft

Activated Sludge Solution Design Parameters

F / M	0.08	lb BOD ₅ / lb MLSS / day
Aerated HRT	16.32	hrs
SVI (after 30 minutes settling)	150	ml/g
Number of Aerated Reactors in Series	3	
Water Depth	16.0	ft
RAS Pumping Rate	100%	of Maximum Month Flow
MLR Pumping Rate	200%	of Maximum Month Flow

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#2 - Bio-P**Designer: **RVK**Project Number: **p31773-22**Date: **11/10/2022****Process Calculations****Nitrification Kinetics**

Refer to Metcalf and Eddy, Edition IV pages 614 and 705

Constants and Temperature Corrections:

Coefficient	Base Value	Theta	Temperature Corrected	Symbol
Maximum Specific Growth Rate of Nitrifying bacteria, g/ VSS/g VSS•day	0.75	1.07	0.43651	$\mu_{nm}(T)$
Half-Velocity constant for nitrifiers	0.74	1.053	0.48956	$K_n(T)$
Nitrifier decay rate	0.08	1.04	0.05846	$K_{dn}(T)$
Dissolved Oxygen in final reactor	2.00		2.00	DO
Half-Velocity Constant for Dissolved Oxygen, mg/l	0.5		0.5	K_o
Minimum Water Temperature, °C	12		12	T
Safety Factor	1.9		1.9	SF

Calculations

$$\mu_n = \left(\mu_{nm}(T) \times \frac{TENH_3}{TENH_3 + K_n(T)} \times \frac{DO}{DO + K_o} \right) - K_{dn}(T)$$

$$\mu_n = \left(0.437 \times \frac{1.0}{1.0 + 0.49} \times \frac{2}{2.0 + 0.5} \right) - 0.058 = 0.18 \text{ days}^{-1}$$

$$SRT_{min} = \frac{1}{\mu_n} = \frac{1}{0.18} = 5.7 \text{ days}^{-1}$$

$$SRT_{aerobic} = SRT_{min} \times SF = 5.7 \times 1.9 = \mathbf{10.7 \text{ days}}$$

Where: $\mu_{nm}(T)$ = Maximum Temperature Corrected Nitrifier Growth Rate (days^{-1}) μ_n = Specific Nitrifier Growth rate at Temperature, DO, and Effluent NH_3 (days^{-1})

SRTmin = Minimum Sludge age required for Nitrification (days)

SRTaerobic = Design Aerobic Sludge Age (days)

SF = Safety Factor

TENH3 = Anticipated Effluent Ammonia (mg/l)

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#2 - Bio-P**Designer: **RVK**Project Number: **p31773-22**Date: **11/10/2022****Sludge Yield**

Refer to WEF MOP/8 4th Edition, pg 11-11, Eqn 11.7

$$\Delta M = \left(\frac{Y \times (BOD_{in} - BOD_{out})}{1 + (B \times \theta^{(T-20)}) \times SRT} + Z_{io} + Z_{no} \right) \times Q \times 8.34 + CS$$

$$\Delta M = \left(\left(\frac{0.6 \times (200 - 5)}{1 + (0.07 \times 1.04^{(12 - 20)}) \times 10.7d} + 50.0 + 75.0 \right) \times 0.15 \times 8.34 \right) + 51 = 301 \text{ lb/day}$$

where: ΔM = Mass of Sludge Produced (lb/day)

Y = Volatile Cell Yield (VSS/BOD Removed)

 θ = Arrhenius Temperature Correction FactorB = Decay Rate (day^{-1})BOD_{out} = Anticipated Effluent BOD (mg/l)

SRT = Solids Retention Time (days)

Z_{io} = Influent Nonvolatile Suspended Solids (mg/l)Z_{no} = Influent Volatile Nonbiodegradable Solids (mg/l)

Q = Maximum month flow, MGD

T = Minimum Wastewater Temperature ($^{\circ}\text{C}$)

CS = Chemical Sludge from Phosphorus Precipitation with Alum (lb/day)

(see chemical sludge production calculations below)

$$BODL = \frac{Q \times BOD \times 8.34}{1,000,000} = \frac{0.150 \times 200 \times 8.34}{1,000,000} = 250 \text{ lb/day}$$

where: Q = Max month flow, MGD

BOD = BOD concentration, mg/l

$$\text{Sludge Yield, } Y_s = \Delta M / BOBL = 301 / 250 = 1.2$$

Chemical Dosing

Initial estimate of phosphorus in WAS, based on assumed % of MLVSS as P

$$P_w = (BOD_{in} - BOD_{out}) \times Y_s \times MLVSS \times P_s = (200 - 5) \times 1.20 \times 0.62 \times 0.045 = 6.6 \text{ mg/l}$$

Where: P_w = Phosphorus removed with WAS, mg/l as PBOD_{in} = Influent BOD, mg/lBOD_{out} = Anticipated Effluent BOD (mg/l)

MLVSS = Mixed Liquor Volatile Suspended Solids Concentration

P_s = Assumed % of MLVSS as P

Based on Assumed % of MLSS, estimate phosphorus concentration to be removed with metal salt

$$P_{mb} = T_{pi} - P_w - P_e = 11.00 - 6.60 - 0.30 = 4.09 \text{ mg/l}$$

Where: P_{mb} = Phosphorus concentration to be removed with metal salt, mg/lT_{pi} = Influent Phosphorus concentration, mg/l

$$CD = MoIR \times P_{mb} / \text{Ion} \times MWR_{\text{Ratio}} =$$

Where: CD = Required Alum dosing rate, mg/l

MoIR = Mole Ratio (Actual Dose required vs. Stoichiometric Dose)

Ion = Fraction Metal Ion in Alum

MWR_{Ratio} = Ratio of Molecular Weights, Al:P

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#2 - Bio-P**Designer: **RVK**Project Number: **p31773-22**Date: **11/10/2022****Mass of Chemical Sludge**

$$CS = Q \times Pmb \times MP \times 8.34 = 0.15 \times 4.09 \times 10.45 \times 8.34 = 54 \text{ lb/d/train}$$

Where: MP = Mass of Precipitate formed per Mass of P removed

Aerated Process Volume

$$Vaer_design = \frac{\Delta M \times SRT}{MLSS \times 8.34} = \frac{301 \times 10.7}{3,800 \times 8.34} = \mathbf{0.102 \text{ MG}}$$

where: Vaer_design = Volume of Aeration Tank, MG
 MLSS = Aeration Tank Mixed Liquor Suspended Solids Concentration, mg/l

Reactor	Actual volume		
Aeration 1	0.034 MG		
Aeration 2	0.034 MG		
Aeration 3	0.034 MG		
Total	0.102 MG		

Anaerobic Process Volume

Size Anaerobic Zone based on 2.3 hour hydraulic detention time at Max. Mo. Flow

Required Volume = MMF x HDT / 24 = 14362 gallons

Anoxic Process Volume

Operate first 2 aerated reactors as aerated anoxic for aerated anoxic vol. = 67,988 gallons

For assumed denitrification rates listed below, required post-anoxic volume = 17,234 gallons

Total anoxic process volume = 85,222

Re-Aeration Process Volume

Size re-aeration zone based on 55.1 minute hydraulic detention time at Max. Mo. Flow

Required Volume = MMF x HDT / 24 = 5745 gallons

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#2 - Bio-P**
 Project Number: **p31773-22**

Designer: **RVK**
 Date: **11/10/2022**

Nitrogen Balance

Constants

Coefficient	Value	Symbol
VSS/TSS	62.5%	
Sludge N	0.062	Ns
Effluent Dissolved Organic Nitrogen, mg/l	1.0	EDON

$$\text{TKN}_{\text{ox}} = \text{TKN} - \text{EDON} - \text{TENH}_3 - \text{N}_{\text{assim}} - \text{N}_{\text{part}} = 40.0 - 1.0 - 1 - 15.1 - 0.20 = \mathbf{22.6 \text{ mg/l}}$$

where: TKN_{ox} = TKN available for oxidation (mg/l)

TKN = Influent TKN (mg/l)

TENH_3 = Effluent $\text{NH}_3\text{-N}$ (mg/l)

N_{assim} = Nitrogen assimilated into sludge (mg/l)

N_{part} = Nitrogen bound to VSS portion of effluent TSS (mg/l)

$$\text{N}_{\text{assim}} = \frac{\Delta M \times \text{Ns}}{Q \times 8.34} = \frac{301 \times 0.06}{0.15 \times 8.34} = 15.1 \text{ mg/l}$$

$$\text{N}_{\text{part}} = \text{TESS} \times \text{Ns} \times \text{VSS/TSS} = 5 \times 0.06 \times 0.62 = \mathbf{0.20 \text{ mg/l}}$$

where TESS = Effluent Total Suspended Solids (mg/l)

$$\text{TENoxN} = \text{TKN}_{\text{ox}} \times (1 - \text{Denite}\%) = 22.6 \times (1 - 1) = 0$$

where: TENox = Total effluent nitrate + nitrite nitrogen (mg/l)

Denite % = Predicted denitrification %, based on Anoxic Process Volume and SNDR

SNDR = See Assumed Denitrification Rates in table below

$$\text{TN} = \text{TENH}_3 + \text{TENox} + \text{EDON} + \text{Npart} = 1 + 0 + 1 + 0.20 = 2.2$$

where: TN = Effluent Total Nitrogen (mg/l)

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#2 - Bio-P**Designer: **RVK**Project Number: **p31773-22**Date: **11/10/2022****Assumed Denitrification Rates**

Check Assumed Denite Rate in each Zone

Reactor	1	2	3	Post-Anoxic
Description	Aeration	Aeration	Aeration	
NO ₃ -N mass to remove	15.11	5.863	0	4.37 lb/d
Mass of MLVSS	673	673	673	341 lb
Required Denite Rate (SND _R)	0.0224	0.0087	0.0000	0.0128 mass NO ₃ -N/mass MLVSS/d
Theoretical Denite Rate at 20C	0.06	0.06	0.06	0.045 mass NO ₃ -N/mass MLVSS/d
DO Switch Function	1	0.5	0.091	1 At design DO concentration
Temperature Correction	0.54	0.54	0.54	0.54 At design water temperature
Adjusted Theoretical Denite Rate	0.032	0.016	0.003	0.024 mass NO ₃ -N/mass MLVSS/d
Assumed Denite rate OK?	YES	YES	YES	YES

Actual Oxygen Demand

$$AOR_T = AOR_C + AOR_N = 300 + 49 = \mathbf{350 \text{ lb/day}}$$

where: AOR_T = Total Actual Oxygen Demand, lb/day AOR_C = Carbonaceous Oxygen Demand, lb/day AOR_N = Nitrogen Oxygen Demand (Including any denitrification credit), lb/day**Carbonaceous Oxygen Demand**

$$AOR_C = BOD_L \times O_{2carb} = 250 \times 1.2 = \mathbf{300 \text{ lb/day}}$$

where: O_{2carb} = O_2/BOD

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#2 - Bio-P**Designer: **RVK**Project Number: **p31773-22**Date: **11/10/2022****Nitrogen Oxygen Demand**

$$AOR_N = TKN_{ox(Mass)} \times 4.6 - DNC = 28 \times 4.6 - 81 = \mathbf{49 \text{ lb/day}}$$

where: $4.6 = O_2/NH_3$

DNC = Denitrification Credit

$$TKN_{ox(Mass)} = TKN_{ox} \times Q = 22.6 \times 0.15 \times 8.34 = 28 \text{ lb/day}$$

$$DNC = NO_3\text{-N}_{removed} \times Q \times 2.86 \times DN \times 8.34 = 22.6 \times 0.15 \times 2.86 \times 1 \times 8.34 = 81 \text{ lb/day}$$

where: DN = Fraction $NO_3\text{-N}_{removed}$ used to calculate denitrification credit = 100%

Based on 100% denitrification in SNDN process

 $NO_3\text{-N}_{removed} = 22.6 \text{ mg/l}$ **Standard Oxygen Demand**

$$SOR = \frac{AOR}{AOR/SOR} = \mathbf{612 \text{ lb/day}}$$

where: SOR = Standard Condition Oxygen Transfer (20°C, 1 atm, $\alpha = \beta = 1$), lb/day

AOR / SOR = Conversion Factor Actual to Standard condition oxygen

$$\frac{AOR}{SOR} = \frac{\alpha \times \theta^{(T_{site} - 20)} (C^*_{sat20} \times \beta \times P_{site} / P_{std} \times C_T / C_{20} - DO)}{C^*_{sat20}}$$

where: α = Alpha factor = 0.6 θ = Temperature coefficient = 1.024 T_{site} = Water temperature, °C = 20 β = Beta factor = 0.98 P_{site} = Site Atmospheric Pressure P_{std} = Standard atmospheric pressure, psia C^*_{sat20} = Dissolved oxygen solubility at standard conditions, mg/l C_T = Dissolved oxygen solubility at site water temperature, mg/l C_{20} = Dissolved oxygen solubility at 20°C, mg/l

DO = Residual dissolved oxygen concentration, mg/l

Aeration Design

Reactor	1	2	3	Total
DO, mg/l	0.0	0.2	2	
AOR, lb/d	110	110	110	331
AOR/SOR	0.588	0.576	0.475	
SOR	188	191	232	612

CASPERON Detailed Design Calculations
SNDN Process

Project Name: **Millington, MD - Scn#2 - Bio-P**Designer: **RVK**Project Number: **p31773-22**Date: **11/10/2022****Clarifier Sizing**

$$A_{\text{design, Max Mo}} = Q_{\text{avg}} / O_{\text{avg}} / \text{No. Clarifiers} = 600,000 / 238.1 / 2 = 1260 \text{ ft}^2$$

$$A_{\text{design, Peak}} = Q_{\text{avg}} / O_{\text{avg}} / \text{No. Clarifiers} = 2,090,000 / 829.4 / 2 = 1260 \text{ ft}^2$$

where: Q = Flow, gpd

A = Area per clarifier, ft²O = Surface overflow rate, gpd/ft²Use Larger Area = 1260 ft²

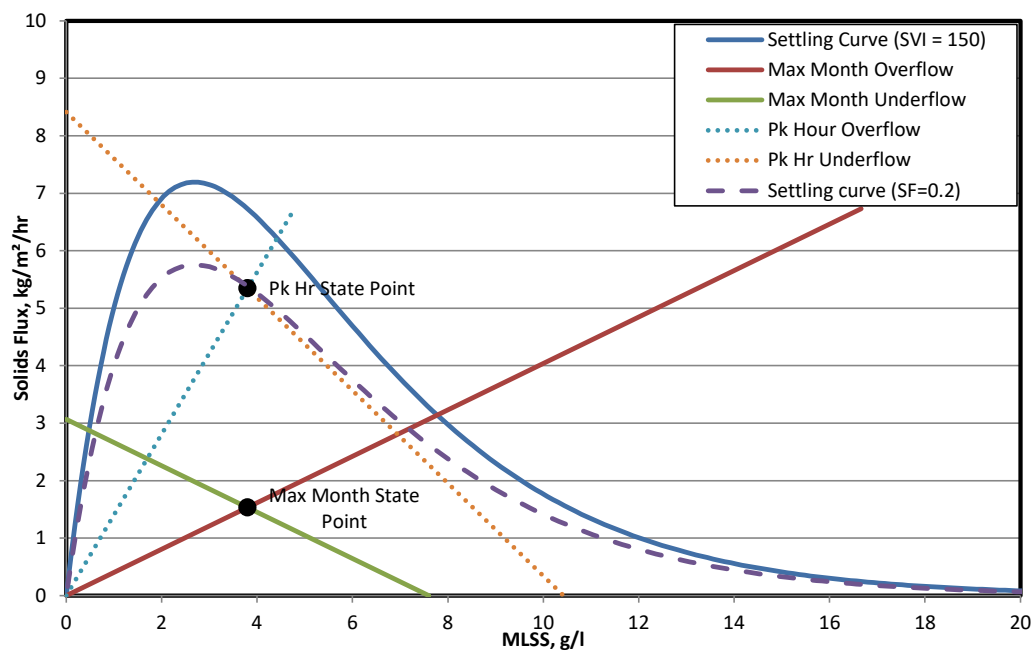
$$\text{Dia. design } [A / \pi \times 4]^{(1/2)} = [1260 / 3.142 \times 4]^{(1/2)} = 40 \text{ ft}$$

Use Clarifier Diameter = 40 ft

Use Clarifier Quantity = 2

Max. Mo. Condition = 3,800 mg/l MLSS and 7,600 mg/l RAS concentration

Peak Condition = 3,800 mg/l MLSS and 10,418 mg/l RAS concentration

State Point Analysis

Max Month State Point is below the settling curve.

Pk Hr State Point is below the settling curve.

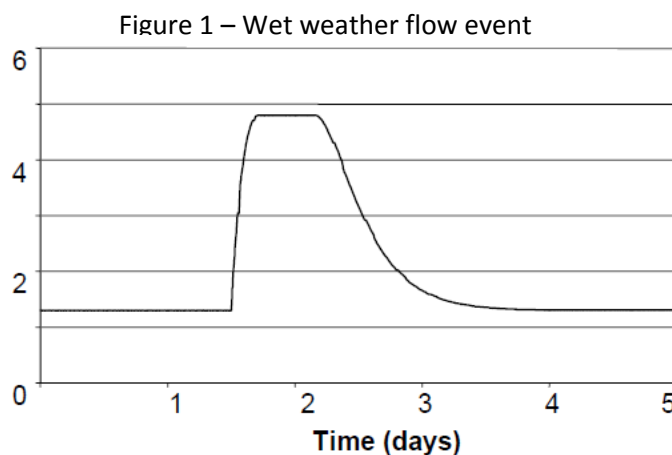
Pk Hr Underflow underflow is below the settling curve.

Clarifier design is adequate.

Operating two or more biological reactors in series has been demonstrated as a reliable method of reducing reactor volumes and lowering power costs by achieving simultaneous nitrification and denitrification. SNDN has been documented by several independent researchers^{1,2,3,4,5} as an energy-efficient method of total nitrogen removal. The challenge for maintaining Aerated Anoxic has been the need to limit the oxygen supply rate during low temperatures and/or low influent load while maintaining mixing, but as long as the aeration/mixing system is properly designed, conditions ideal for SNDN can be consistently maintained.

Systems with two or more reactors operated in series can also be easily designed to operate in step-feed or contact stabilization modes during peak hydraulic loads due to infiltration/inflow, reducing the solids loading rate on secondary clarifiers to maintain good effluent quality and to retain biomass during these peak flow events.

For example, consider a hypothetical case with 3 reactors operated in series, where a plant that normally treats about 1.2 MGD experiences a 12-hr peak flow of 4.8 MGD, operating at an MLSS concentration of about 4,800 mg/l (see figure 1 below):



¹ Littleton, Daigger, Strom, Mechanisms of Simultaneous Biological Nutrient Removal in Closed Loop Reactors, WEFTEC 2003

² Barnard, Dunlap, Steichen, Utilizing Simultaneous Nitrification and Denitrification in BNR Plants to the Maximum Effect, WEFTEC 2013

³ Jimenez, Simultaneous Nitrification-Denitrification to Meet Low Effluent Nitrogen Limits, VWEA 2012

⁴ Fitzgerald, Noguera, Camejo, Ammonia-oxidizing microbial communities in reactors with efficient nitrification at low-dissolved oxygen, Water Research – Dec 2014

⁵ Barnes, Applegate, Handling Hydraulic Peaks with Reactors in Series, KY/TN WEA 2002

Figures 2A and 2B show what happens if the influent and RAS flows are both sent to the first reactor. The mixed concentration in all three reactors drops as mixed liquor solids are “pushed” into the final clarifiers, and the sludge blanket in the final clarifiers rises, with a risk of high TSS in the effluent and the loss of biology needed for treatment.

Figure 2A – MLSS in Normal Mode

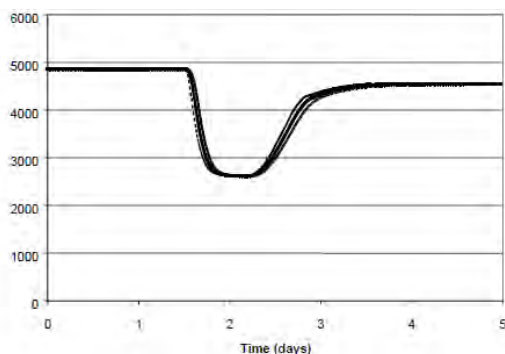
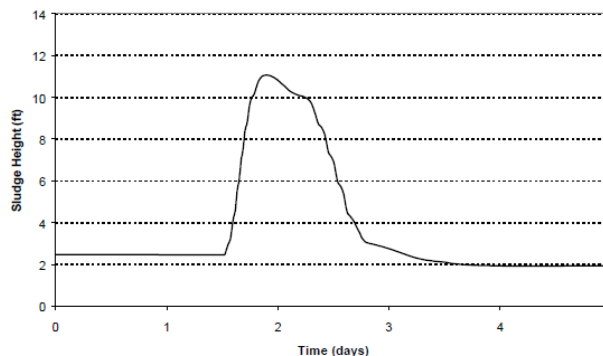


Figure 2B – Clarifier Blanket Depth in Normal Mode



Figures 3A and 3B show what happens if the influent is diverted to the second reactor, with the RAS flow continuing to be fed to the first reactor (contact stabilization mode). The mixed liquor concentration in the second and third reactors drops, but the solids concentration in the first reactor rises. Instead of the solids blanket rising in the final clarifiers, the solids are shifted to the first reactor, preventing the loss of biosolids over the clarifier weirs and maintaining treatment.

Figure 2A – MLSS for Contact Stabilization

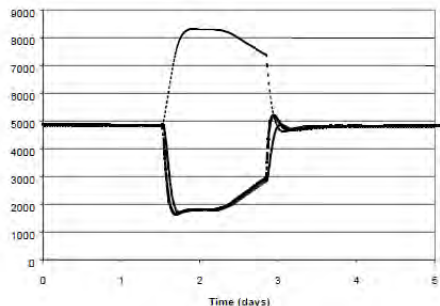
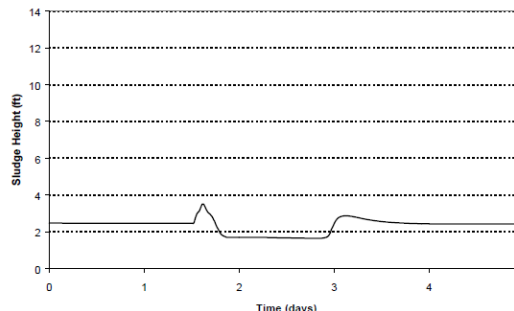
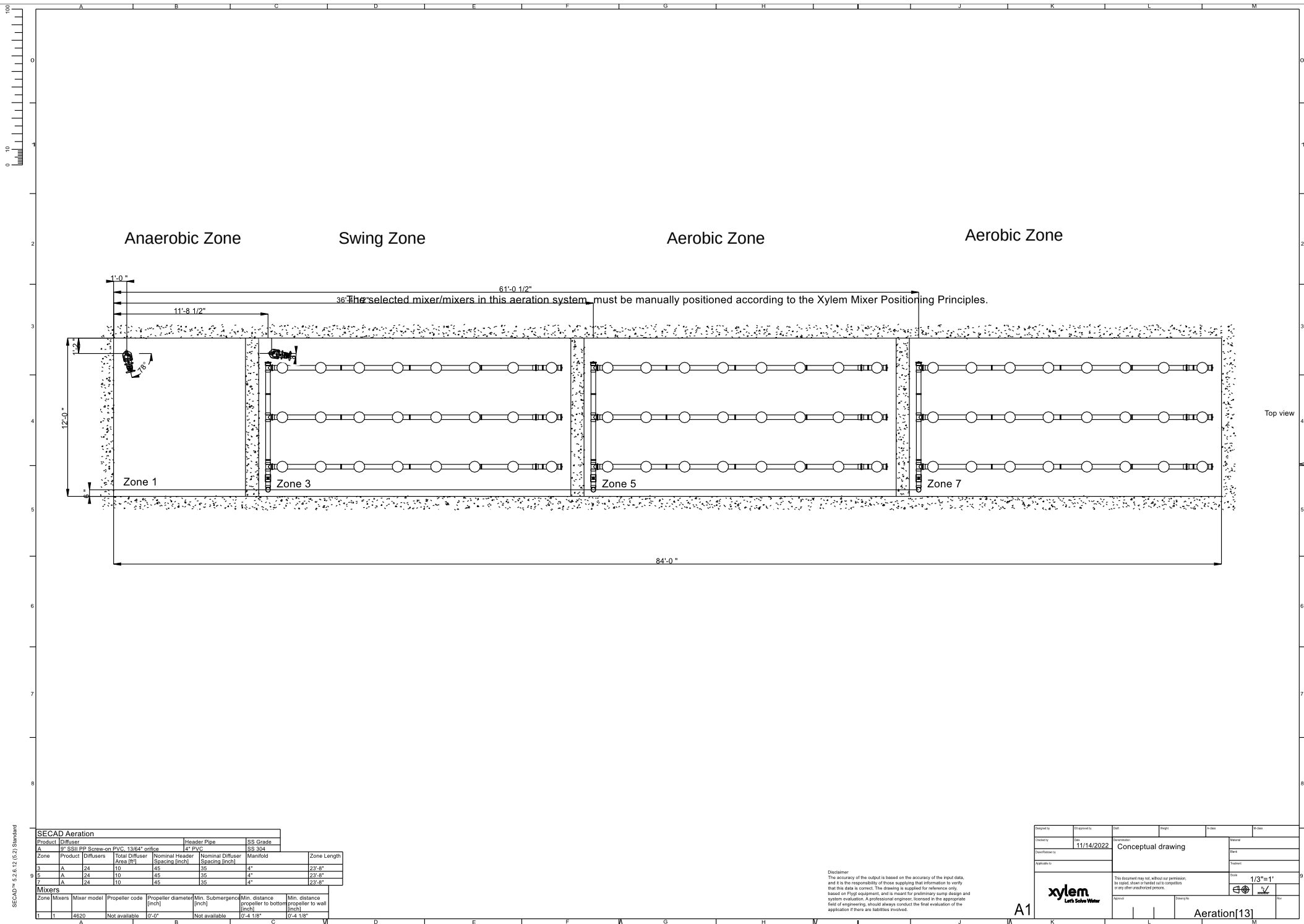


Figure 2B – Clarifier Blanket for Contact Stabilization



Operating in contact stabilization mode maintains excellent BOD and TSS removal rates, but ammonia removal efficiency will decline somewhat in this operating mode. However, as the influent wastewater will be more dilute during the wet weather event, the effluent ammonia concentrations remain low in most cases, and the wastewater plant will easily meet its 30-day average effluent ammonia limit if operated in contact stabilization mode only during peak flow events.

During less extreme peak flow events, the influent flow can be split between the first and second reactors (step feed mode). In this mode, ammonia removal efficiency will be higher than contact stabilization mode, but the reduction in the solids loading rate to the final clarifier will not be as great. As wet weather flows increase and subside, control systems can “step” from normal mode to step-feed, from step-feed to contact stabilization (and vice-versa) as needed to maintain optimum effluent quality.



SECAD Aeration									
Product	Diffuser	Header Pipe				SS Grade			
A	1" SSI #2 Screw-on PVC, 13364" orifice	14" PVC				SS 304			
Zone	Product	Diffusers	Total Diffuser Area (ft²)	Nominal Header Spacing (inches)	Nominal Diffuser Spacing (inches)	Manifold	Zone Length		
3	A	24	10	45	35	4"	23'-8"		
5	A	24	10	45	35	4"	23'-8"		
7	A	24	10	45	35	4"	23'-8"		
Mixers									
Zone	Mixer model	Propeller code	Propeller diameter (inches)	Min. Submergence (inches)	Min. distance propeller to bottom (inches)	Min. distance propeller to wall (inches)			
1	1	4620	Not available	0'-0"	Not available	0'-4 1/8"	0'-4 1/8"		

Disclaimer
The accuracy of the output is based on the accuracy of the input data, and it is the responsibility of those supplying that information to verify that the data is correct. The drawing is supplied for reference only, based on Fygi equipment, and is meant for preliminary design and system evaluation. A professional engineer, licensed in the appropriate field of engineering, should always conduct the final evaluation of the application if there are liabilities involved.

Designed by	Reviewed by	Drawn	Checked	Scale	Notes				
Checked by	Date	11/14/2022	Conceptual drawing						
Drawn/Revised by					Material				
Applicable to					Notes				
					1/3"=1'				
					Scale				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				
					Notes				
					Revision				
					Drawn by				
					Checked by				
					Scale				

NP 3069 MT 3~ Adaptive 434

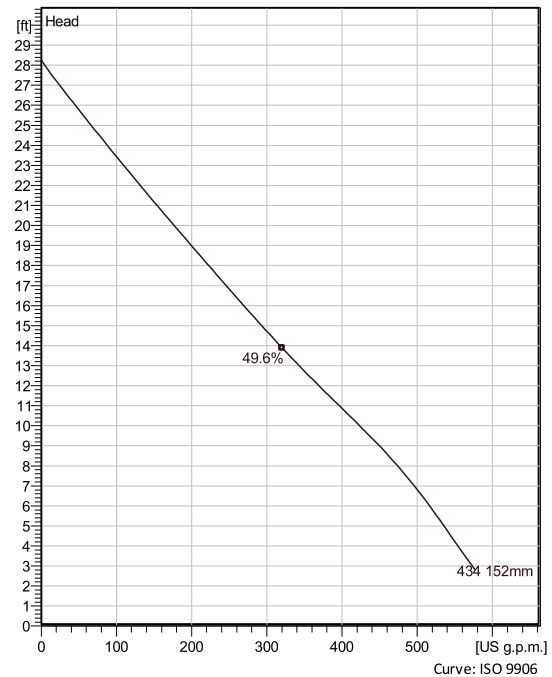
Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.



Technical specification



Curves according to: Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Configuration

Motor number N3069.060 13-08-4BB-W 2.4hp	Installation type P - Semi permanent, Wet
Impeller diameter 152 mm	Discharge diameter 3 inch

Pump information

Impeller diameter 152 mm
Discharge diameter 3 inch
Inlet diameter 113 mm
Maximum operating speed 1665 rpm
Number of blades 2
Max. fluid temperature 40 °C

Materials

Impeller Hard-Iron™
Stator housing material Grey cast iron

Project	Created by	Richard Kesseli
Block	Created on	11/21/2022
	Last update	11/21/2022

NP 3069 MT 3~ Adaptive 434

Technical specification



Motor - General

Motor number N3069.060 13-08-4BB-W 2.4hp	Phases 3~	Rated speed 1665 rpm	Rated power 2.4 hp
ATEX approved No	Number of poles 4	Rated current 4.1 A	Stator variant 1
Frequency 60 Hz	Rated voltage 460 V	Insulation class F	Type of Duty S1
Version code 060			

Motor - Technical

Power factor - 1/1 Load 0.78	Motor efficiency - 1/1 Load 71.3 %	Total moment of inertia 0.273 lb ft ²	Starts per hour max. 15
Power factor - 3/4 Load 0.68	Motor efficiency - 3/4 Load 71.9 %	Starting current, direct starting 17 A	
Power factor - 1/2 Load 0.54	Motor efficiency - 1/2 Load 68.6 %	Starting current, star-delta 5.67 A	

Project
Block

Created by Richard Kesseli
Created on 11/21/2022 **Last update**

11/21/2022

NP 3069 MT 3~ Adaptive 434

Performance curve

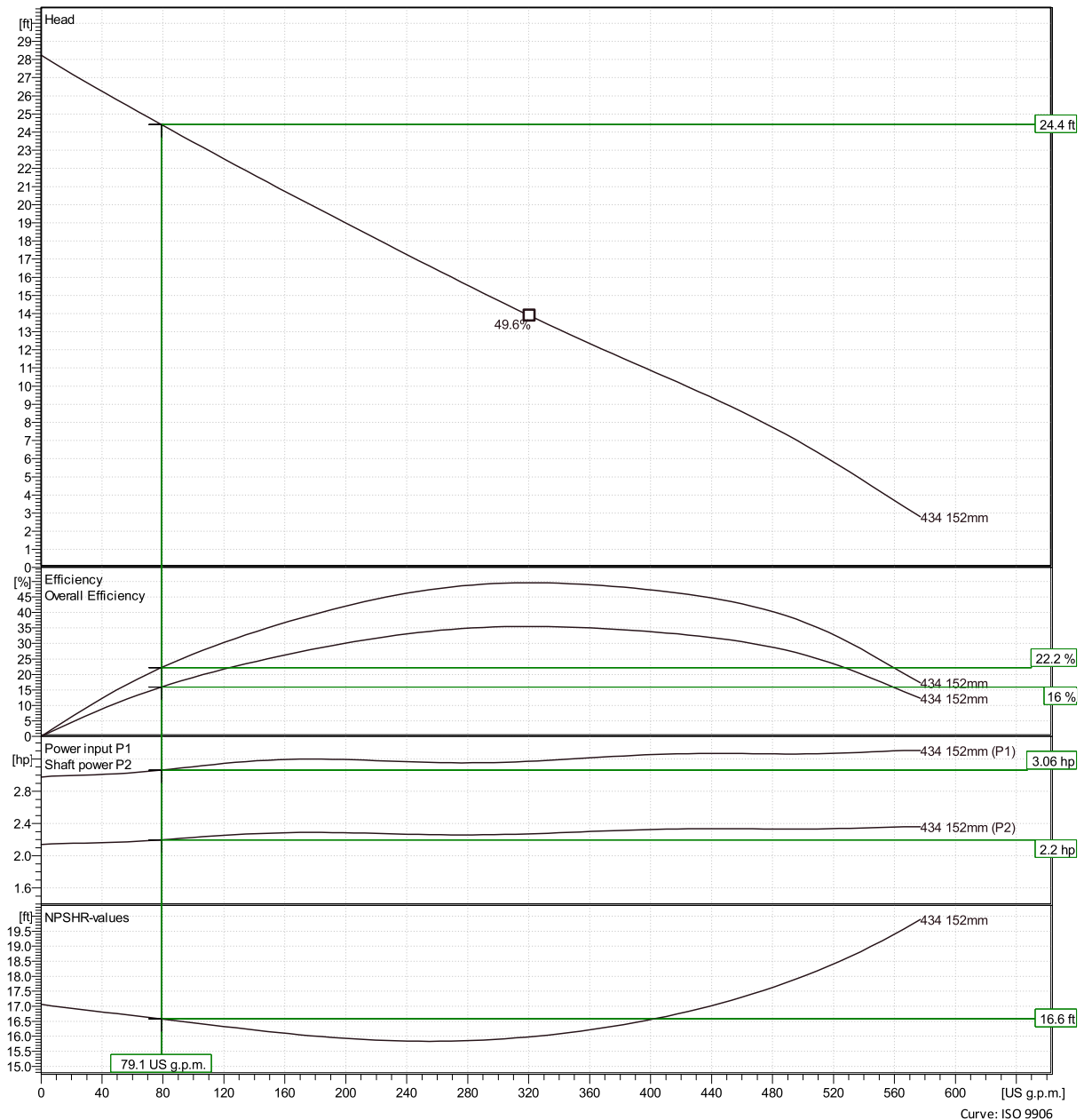


Duty point

Flow
79.1 US g.p.m.

Head
24.4 ft

Curves according to: Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Project
Block

Created by Richard Kesseli
Created on 11/21/2022 Last update 11/21/2022

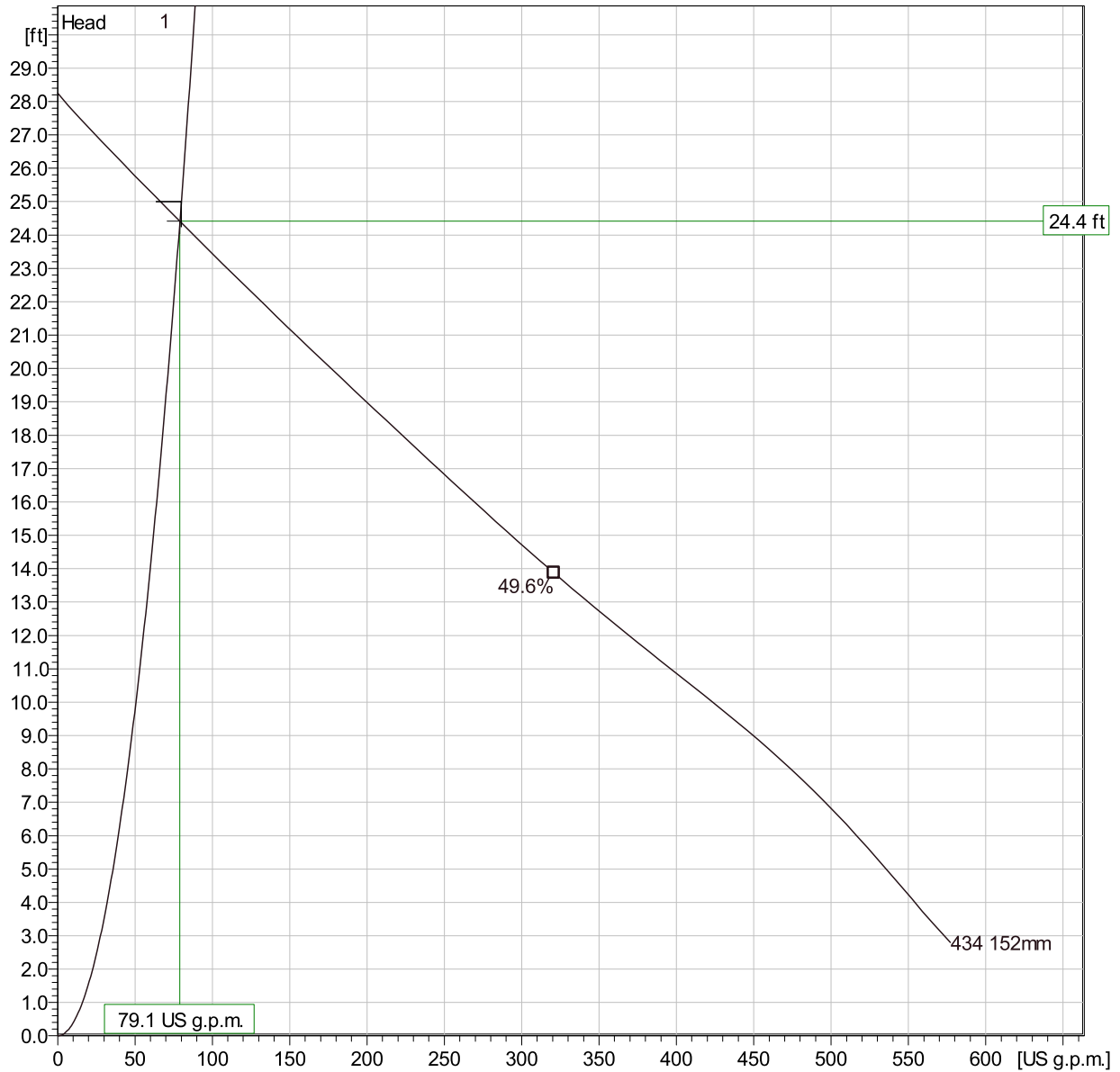
11/21/2022

NP 3069 MT 3~ Adaptive 434

Duty Analysis



Curves according to: Water, pure, 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific Energy	NPSHre
1	79.1 US g.p.m.	24.4 ft	2.2 hp	79.1 US g.p.m.	24.4 ft	2.2 hp	22.2 %	481 kWh/US Ml	16.6 ft

Project
Block

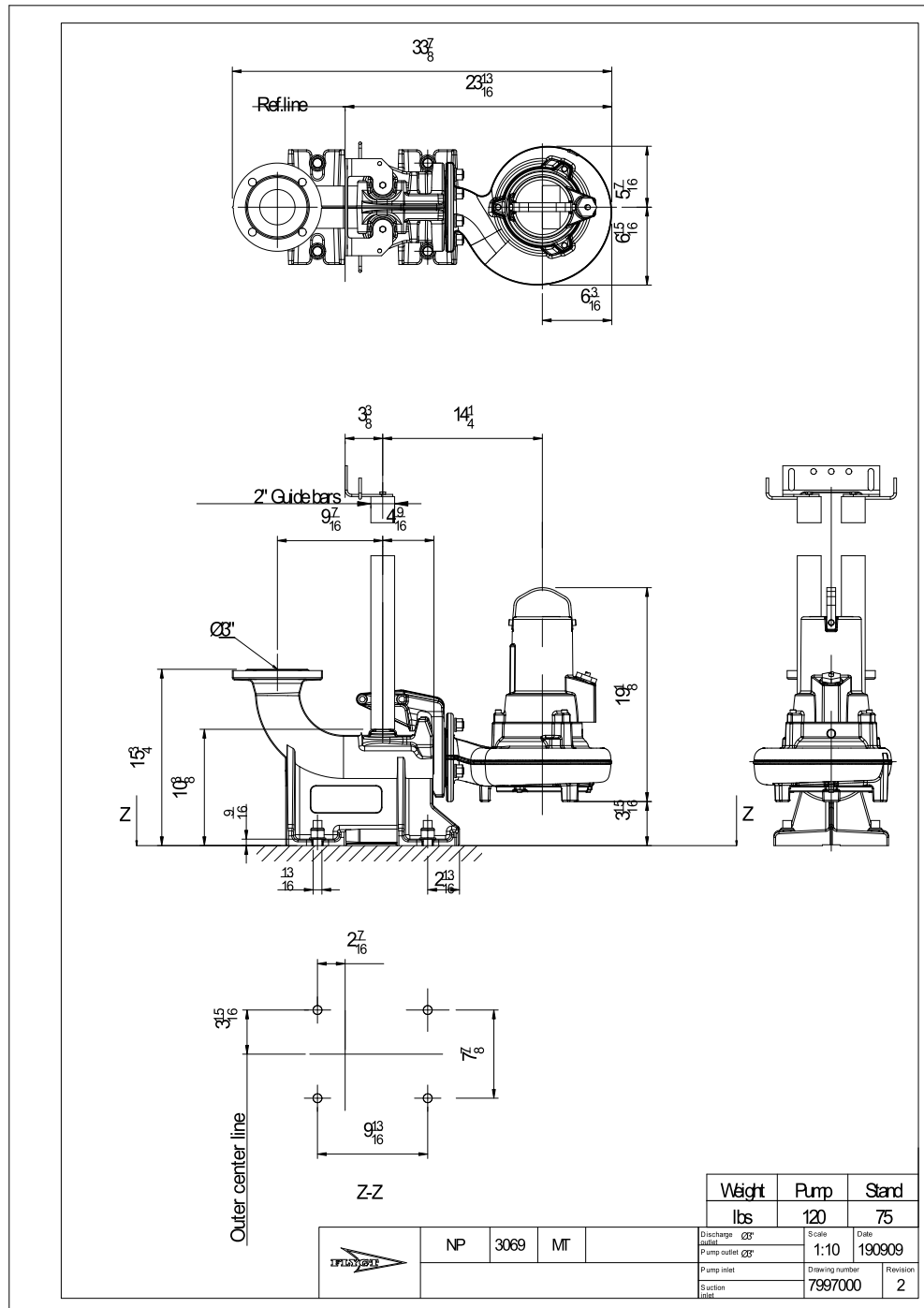
Created by Richard Kesseli
Created on 11/21/2022

Last update

11/21/2022

NP 3069 MT 3~ Adaptive 434

Dimensional drawing



Project
Block

Created by Richard Kesseli
Created on 11/21/2022 Last update

11/21/2022

PP 4630 ** 3~837

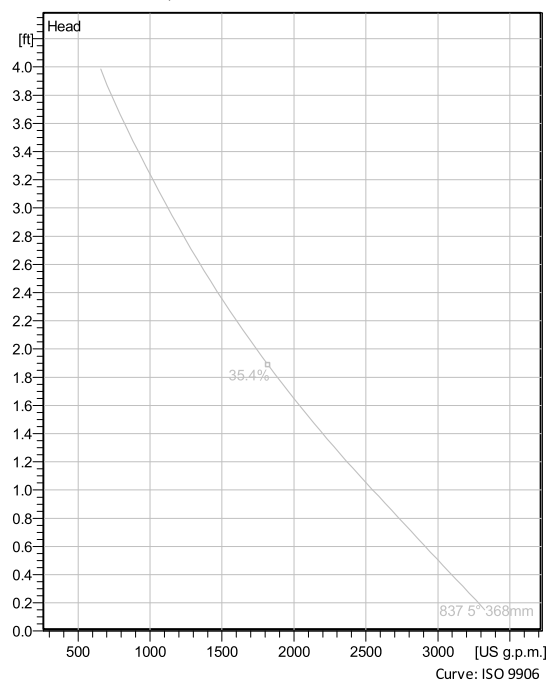
Horizontal flow propeller pumps with fixed pitch blades for high capacity low head pumping of clean or slightly contaminated liquids. The pumps are extremely compact, using multipole motors instead of mechanical gearing.



Technical specification



Curves according to: Water, pure Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Configuration

Motor number P4630.412 18-08-8AA-W 2.5hp	Installation type P - Semi permanent, Wet
Impeller diameter 368 mm	Discharge diameter 15 inch

Configuration

Pump information

Impeller diameter 368 mm
Discharge diameter 15 inch
Inlet diameter 375 mm
Maximum operating speed 855 rpm
Number of blades 3

Material

Impeller Stainless steel

Max. fluid temperature 40 °C
--

Project	Created by Richard Kesseli
Block	Created on 11/14/2022 Last update 11/14/2022

PP 4630 ** 3~ 837

Technical specification



Motor - General

Motor number P4630.412 18-08-8AA-W 2.5hp	Phases 3~	Rated speed 855 rpm	Rated power 2.5 hp
ATEX approved No	Number of poles 8	Rated current 4.2 A	Stator variant 31
Frequency 60 Hz	Rated voltage 460 V	Insulation class H	Type of Duty S1
Version code 412			

Motor - Technical

Power factor - 1/1 Load 0.73	Motor efficiency - 1/1 Load 75.5 %	Total moment of inertia 0.237 lb ft ²	Starts per hour max. 30
Power factor - 3/4 Load 0.65	Motor efficiency - 3/4 Load 76.5 %	Starting current, direct starting 14 A	
Power factor - 1/2 Load 0.53	Motor efficiency - 1/2 Load 73.5 %	Starting current, star-delta 4.66 A	

Project
Block

Created by Richard Kesseli
Created on 11/14/2022 **Last update** 11/14/2022

PP 4630 ** 3~837

Performance curve

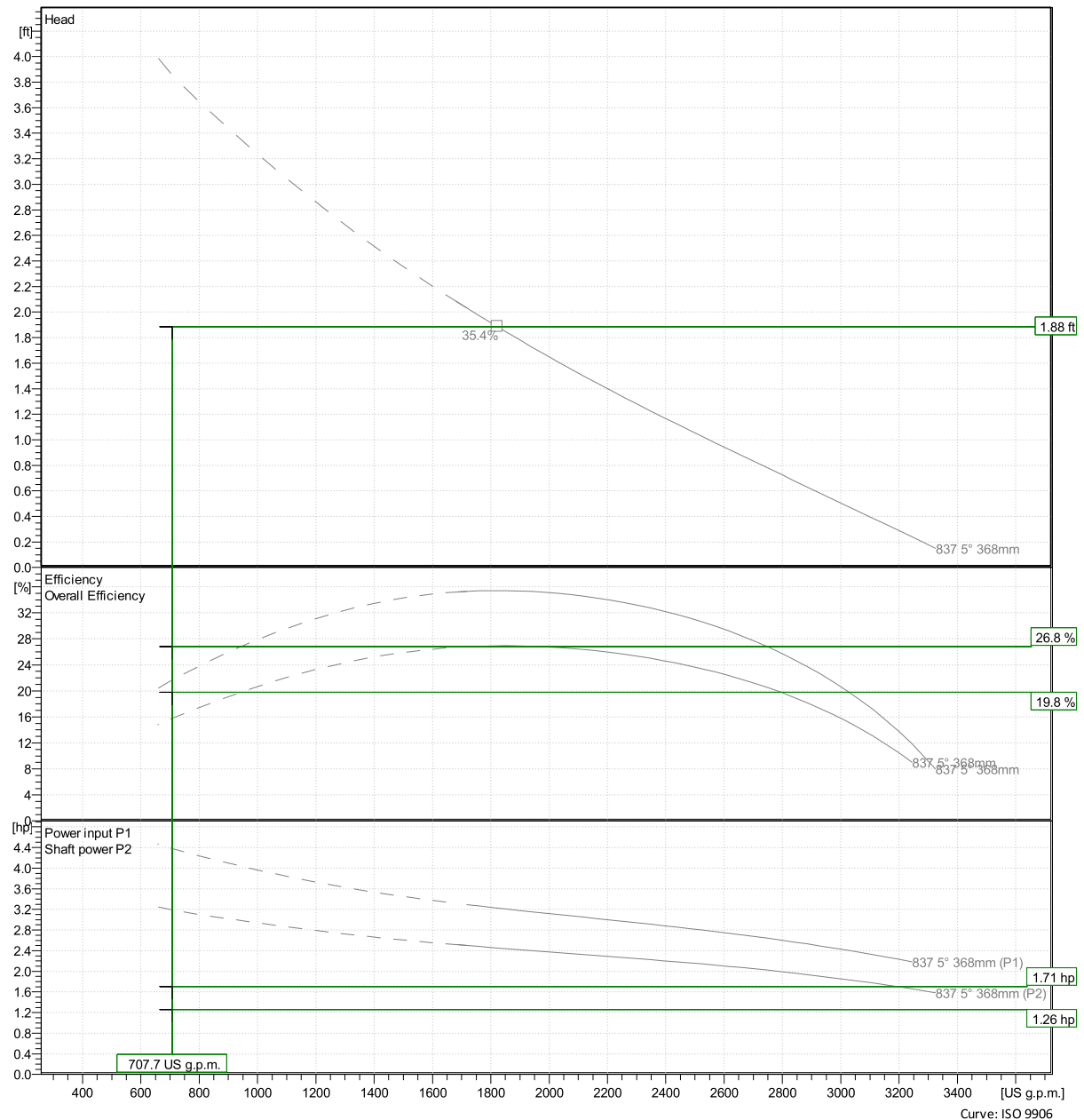


Duty point

Flow
708 US g.p.m.

Head
1.88 ft

Curves according to: Water, pure Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Richard Kesseli

Created on 11/14/2022 Last update

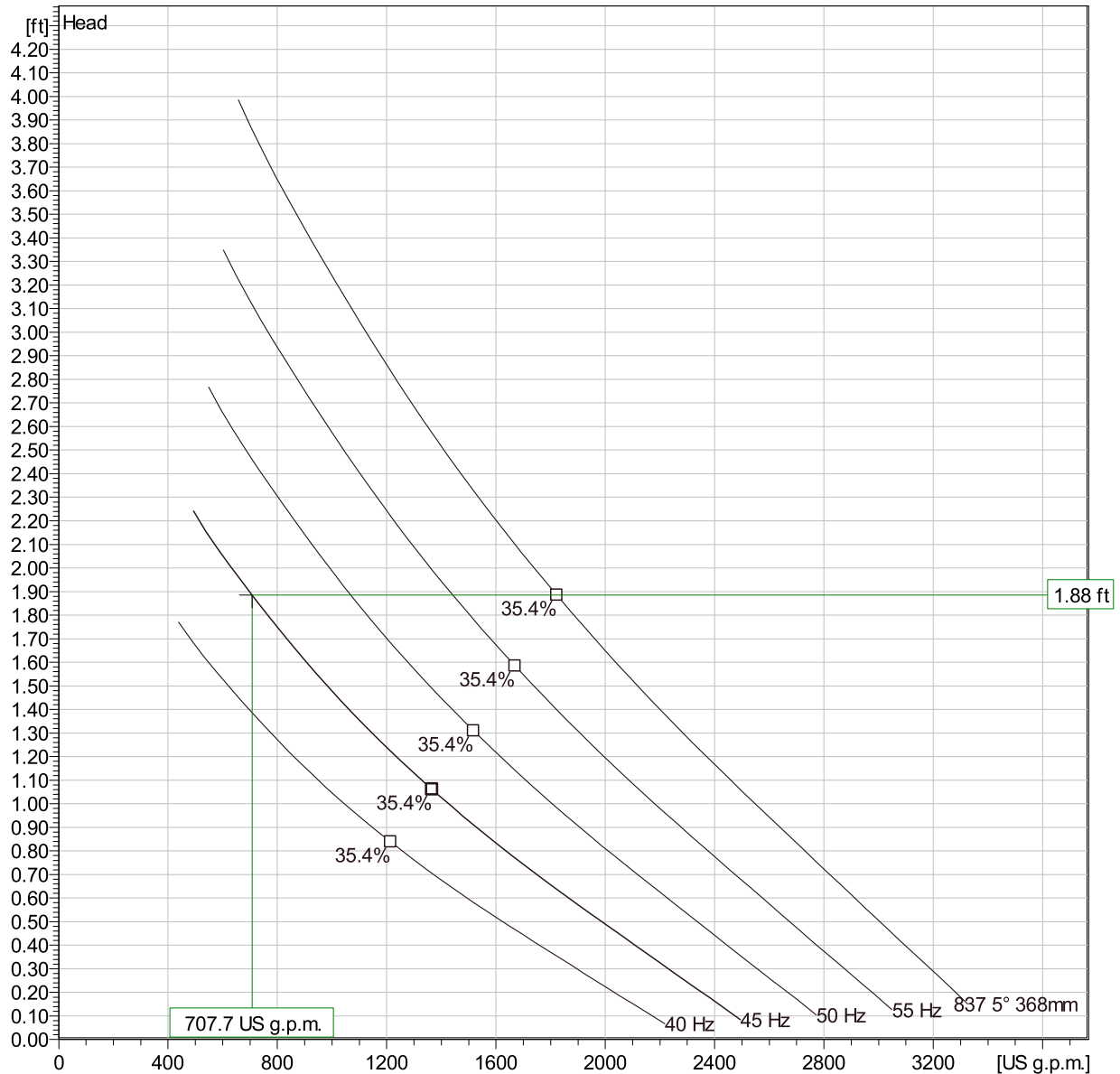
11/14/2022

PP 4630 ** 3~837

Duty Analysis



Curves according to: Water, pure [100%]; 39.2°F; 62.42lb/ft³; 1.6891E-5ft²/s



Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Spec. Energy	NPSHre
	US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft
Scn 2	835	3.57	3.07	835	3.57	3.07	24.6 %	62.3	
Scn 1	944	3.35	2.98	944	3.35	2.98	26.8 %	53.2	

Project
Block

Created by Richard Kesseli
Created on 11/14/2022

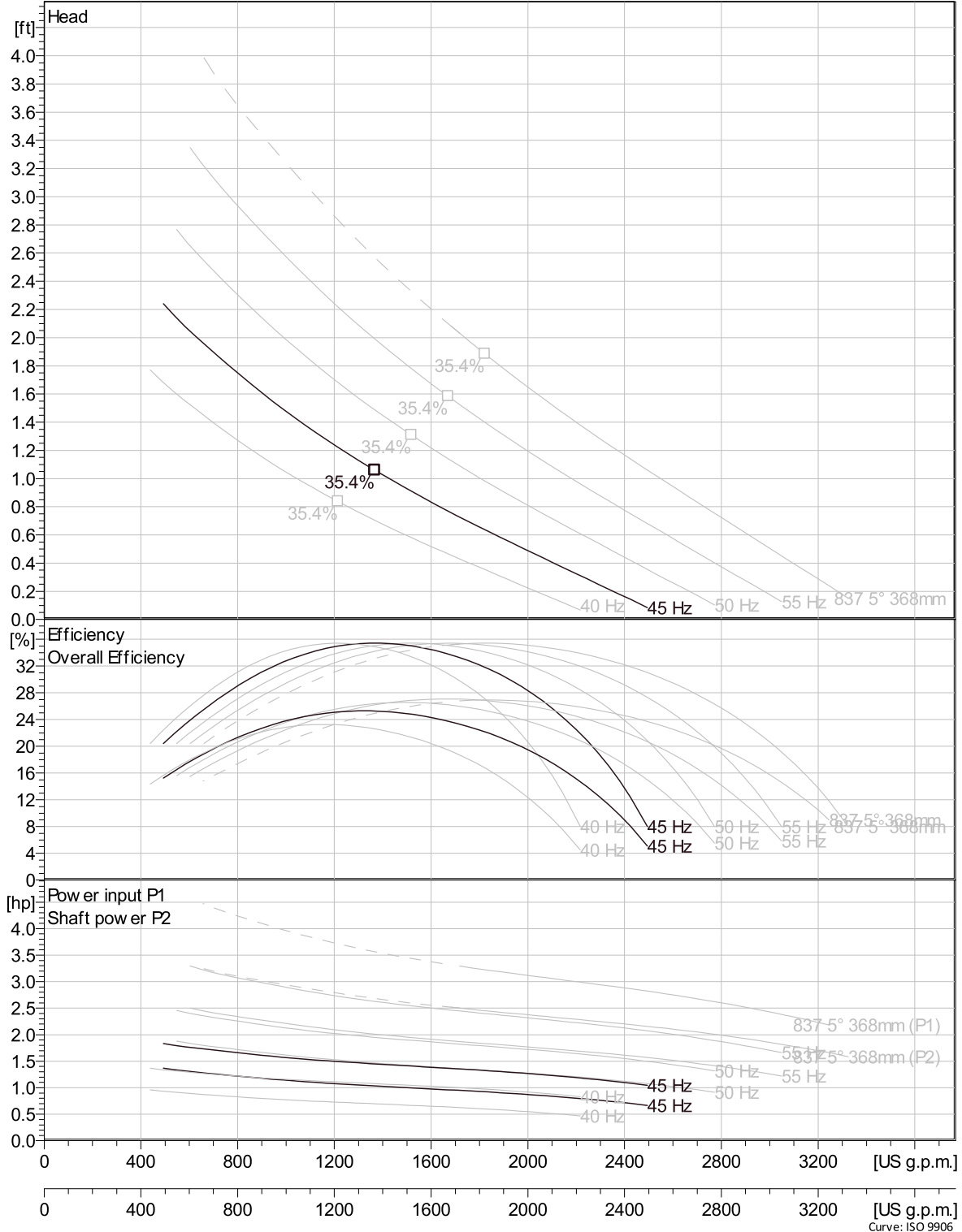
Last update 11/14/2022

PP 4630 ** 3~837

VFD Curve



Curves according to: Water, pure, 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s

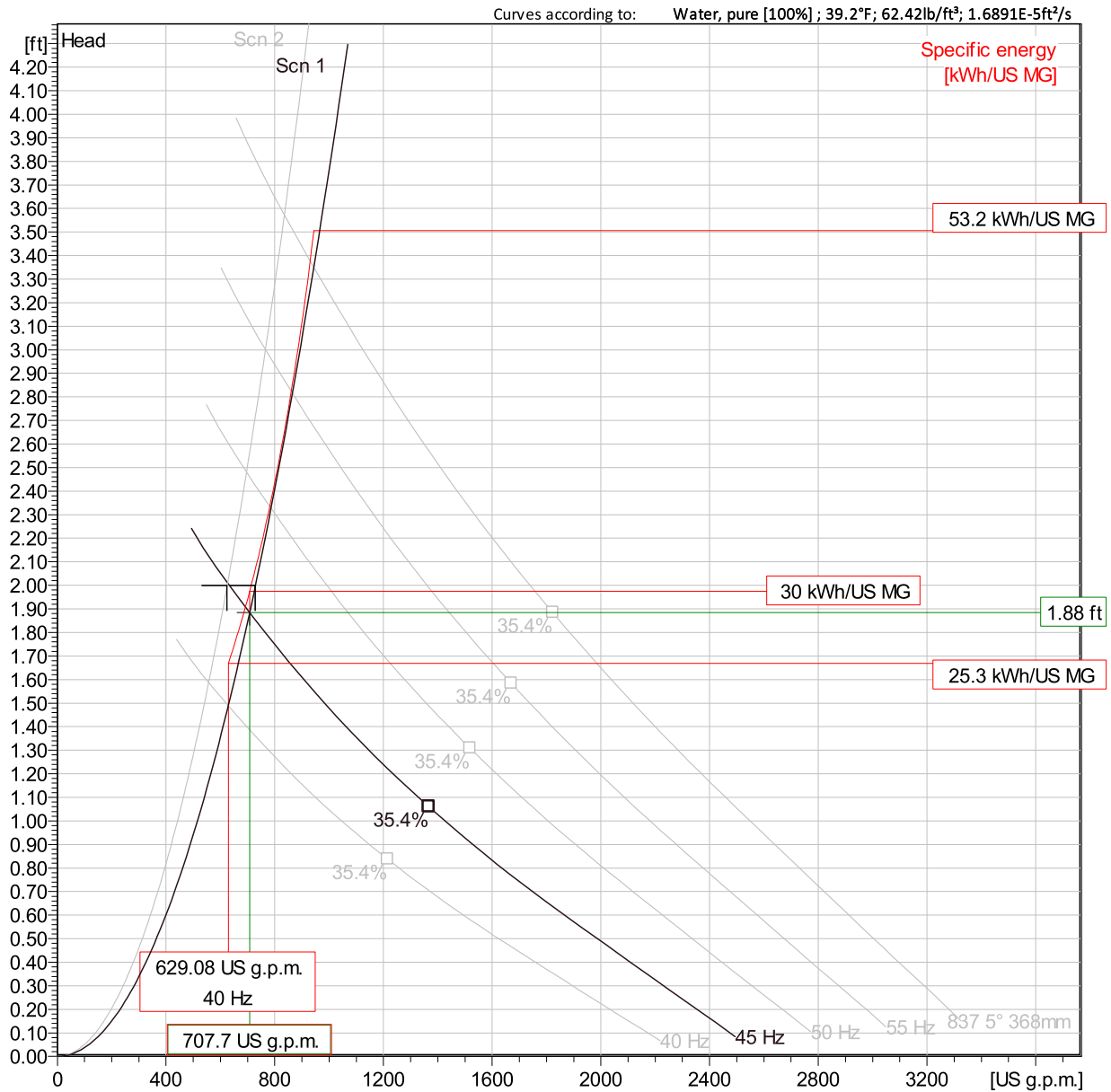


Project
Block

Created by Richard Kesseli
Created on 11/14/2022 Last update 11/14/2022

PP 4630 ** 3~837

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Specific energy	NPSHre
		US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	
Scn 2	60 Hz	835	3.57	3.07	835	3.57	3.07	24.6 %	62.3	
Scn 2	55 Hz	766	3	2.37	766	3	2.37	24.6 %	50.4	
Scn 2	50 Hz	696	2.48	1.78	696	2.48	1.78	24.6 %	41.6	
Scn 2	45 Hz	626	2.01	1.3	626	2.01	1.3	24.6 %	34.7	

Project

Created by

Richard Kesseli

Block

Created on

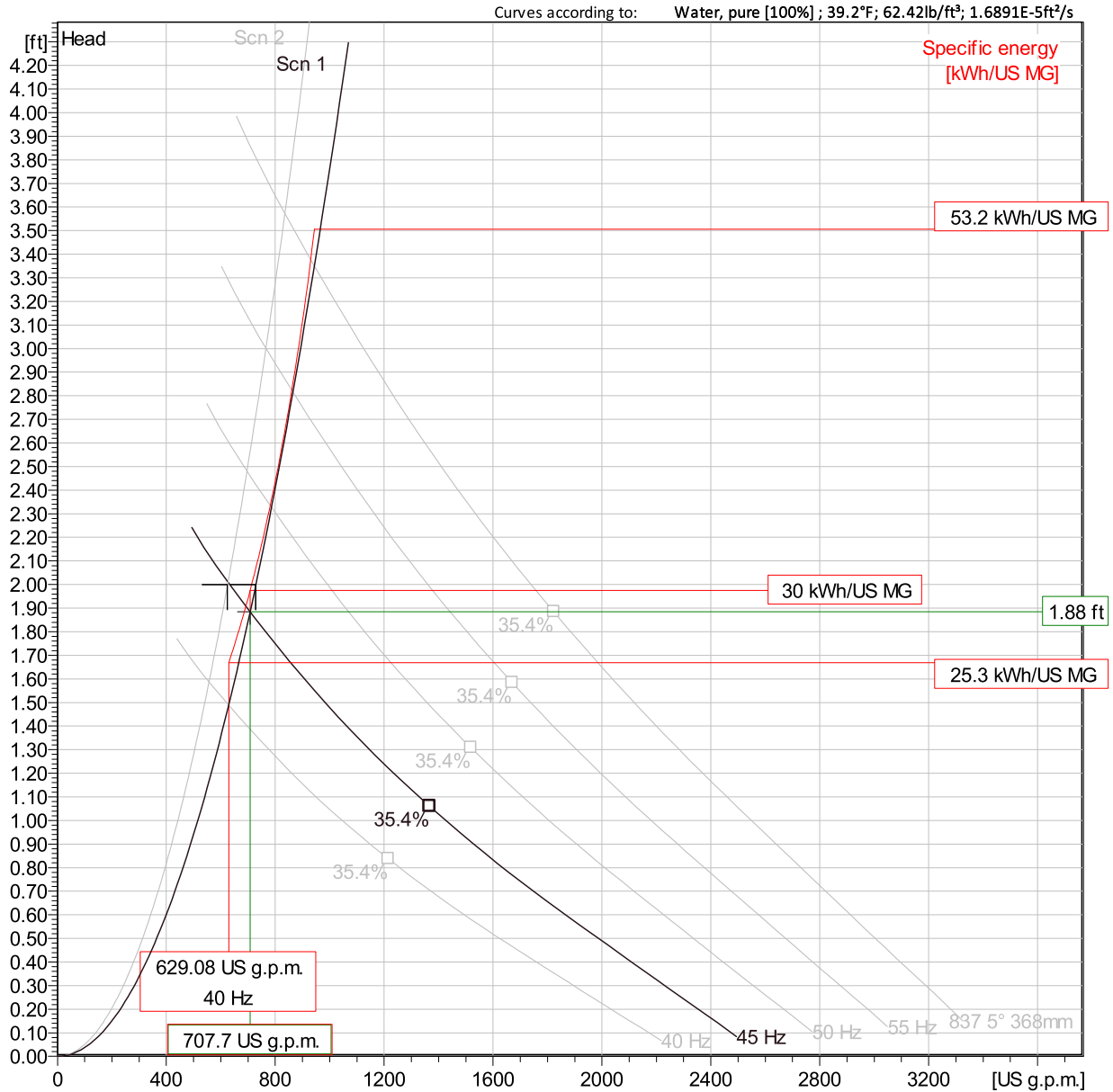
11/14/2022

Last update

11/14/2022

PP 4630 ** 3~837

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Specific energy	NPSHre
		US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	
Scn 2	40 Hz	557	1.59	0.91	557	1.59	0.91	24.6 %	29.2	
Scn 1	60 Hz	944	3.35	2.98	944	3.35	2.98	26.8 %	53.2	
Scn 1	55 Hz	865	2.82	2.3	865	2.82	2.3	26.8 %	43.3	
Scn 1	50 Hz	786	2.33	1.73	786	2.33	1.73	26.8 %	35.8	

Project

Created by

Richard Kesseli

Block

Created on

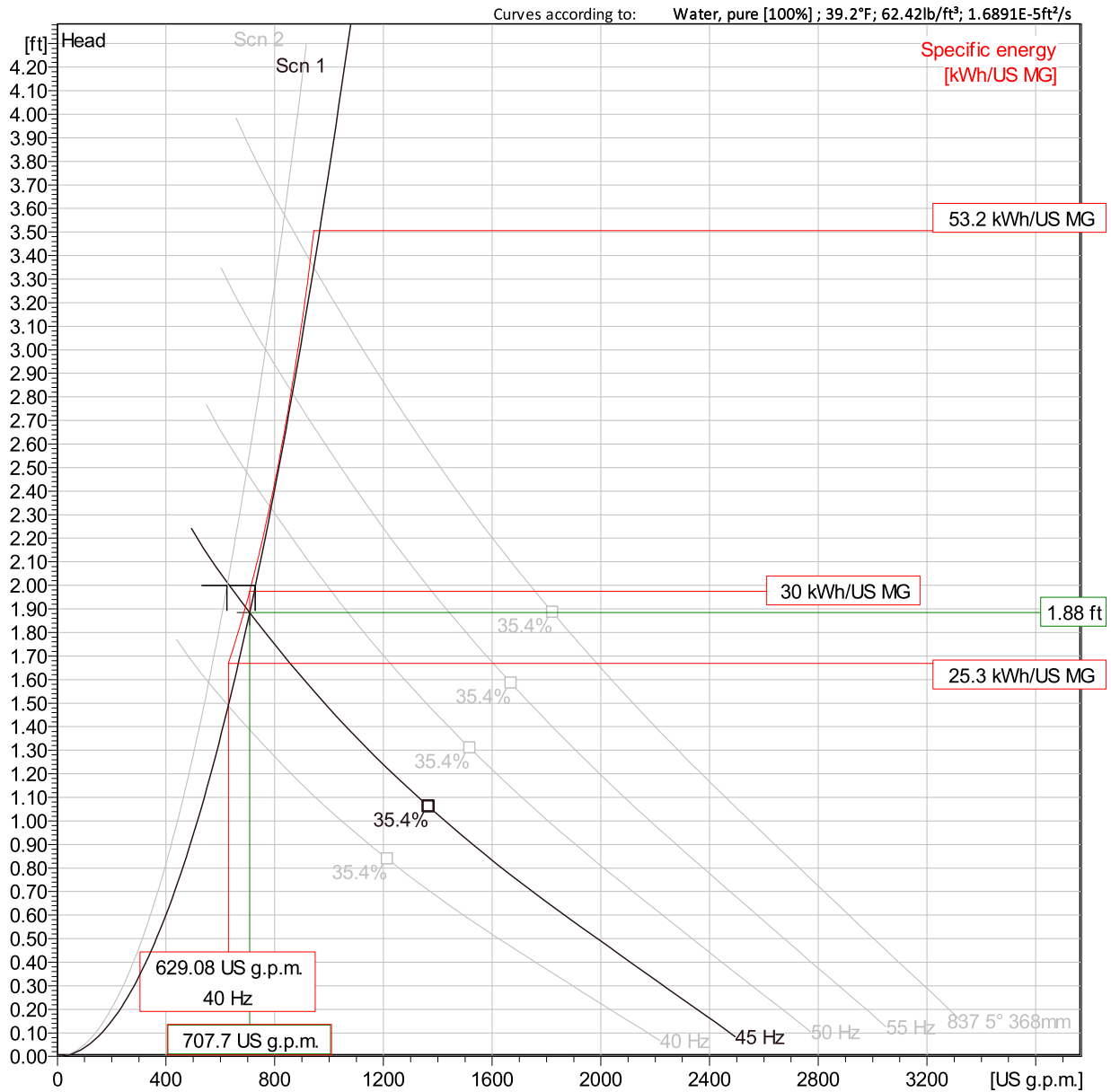
11/14/2022

Last update

11/14/2022

PP 4630 ** 3~837

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow US g.p.m.	Head ft	Shaft power hp	Flow US g.p.m.	Head ft	Shaft power hp	Hydr. eff.	Specific energy kWh/US MG	NPSHre ft
Scn 1	45 Hz	708	1.88	1.26	708	1.88	1.26	26.8 %	30	
Scn 1	40 Hz	629	1.49	0.884	629	1.49	0.884	26.8 %	25.3	

Project

Block

Created by

Richard Kesseli

Created on

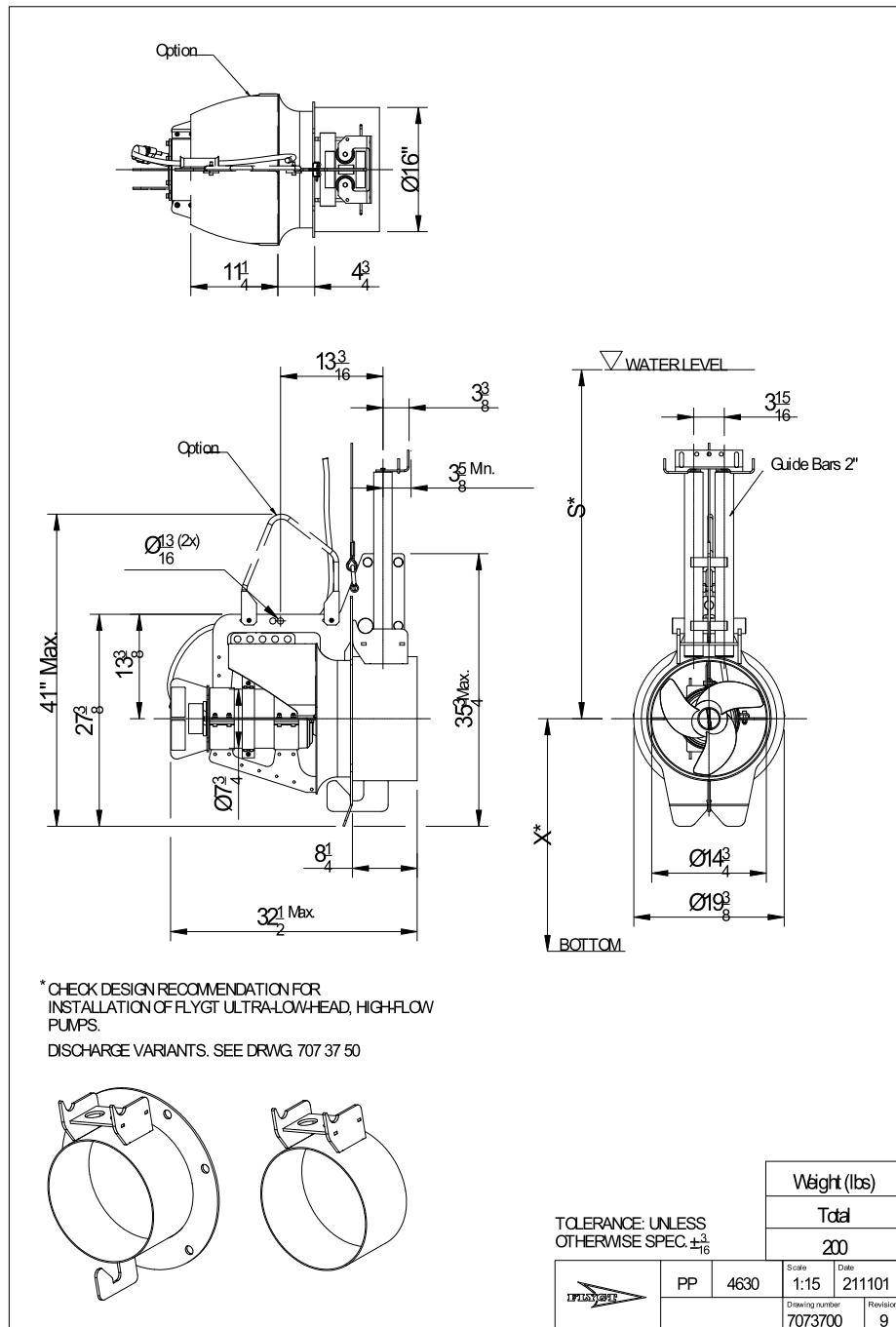
11/14/2022

Last update

11/14/2022

PP 4630 ** 3~837

Dimensional drawing



Project
Block

Created by Richard Kesseli
Created on 11/14/2022 Last update

11/14/2022

NP 3069 MT 3~ Adaptive 436

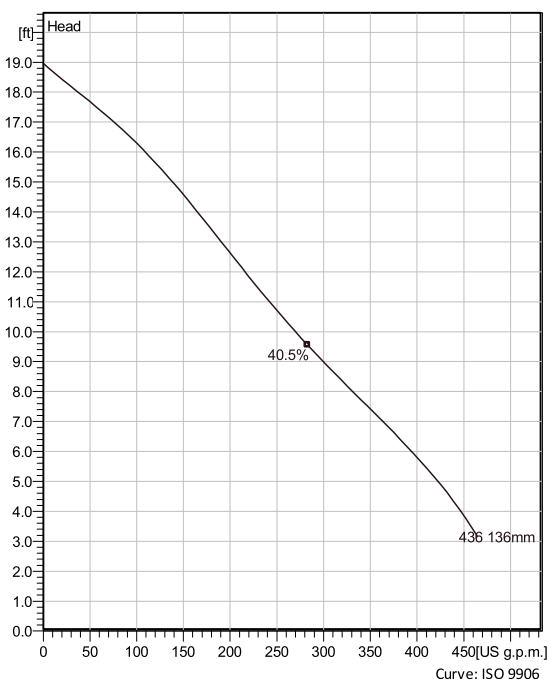
Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.



Technical specification



Curves according to: Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Configuration

Motor number N3069.060 13-08-4BB-W 2.4hp	Installation type P - Semi permanent, Wet
Impeller diameter 136 mm	Discharge diameter 3 inch

Pump information

Impeller diameter 136 mm
Discharge diameter 3 inch
Inlet diameter 113 mm
Maximum operating speed 1665 rpm
Number of blades 2
Max. fluid temperature 40 °C

Materials

Impeller Hard-Iron TM
Stator housing material Grey cast iron

Project	Created by Richard Kesseli	
Block	Created on 11/21/2022 Last update	11/21/2022

NP 3069 MT 3~ Adaptive 436

Technical specification



Motor - General

Motor number N3069.060 13-08-4BB-W 2.4hp	Phases 3~	Rated speed 1665 rpm	Rated power 2.4 hp
ATEX approved No	Number of poles 4	Rated current 4.1 A	Stator variant 1
Frequency 60 Hz	Rated voltage 460 V	Insulation class F	Type of Duty S1
Version code 060			

Motor - Technical

Power factor - 1/1 Load 0.78	Motor efficiency - 1/1 Load 71.3 %	Total moment of inertia 0.258 lb ft ²	Starts per hour max. 15
Power factor - 3/4 Load 0.68	Motor efficiency - 3/4 Load 71.9 %	Starting current, direct starting 17 A	
Power factor - 1/2 Load 0.54	Motor efficiency - 1/2 Load 68.6 %	Starting current, star-delta 5.67 A	

Project
Block

Created by Richard Kesseli
Created on 11/21/2022 **Last update**

11/21/2022

NP 3069 MT 3~ Adaptive 436

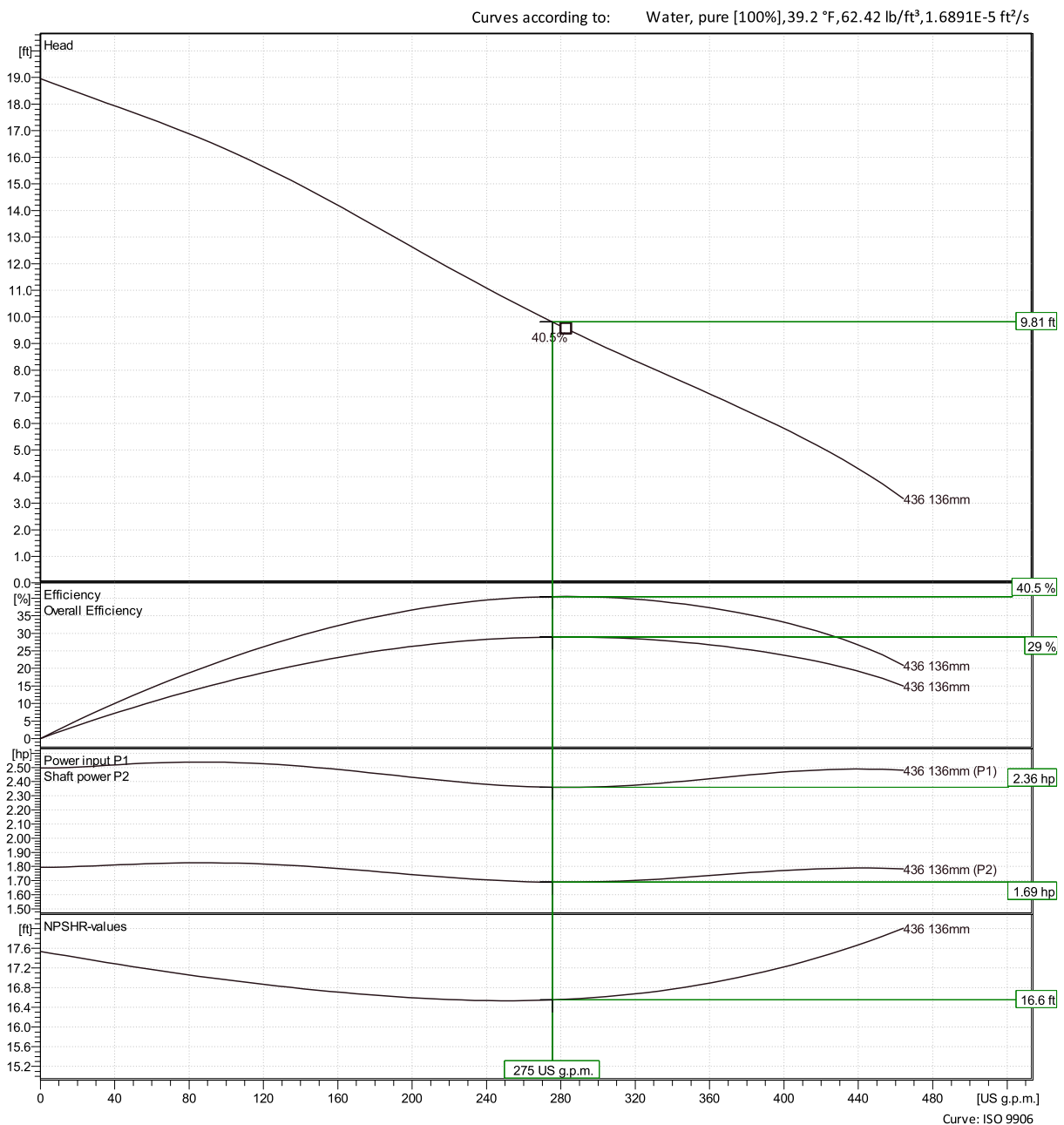
Performance curve



Duty point

Flow
275 US g.p.m.

Head
9.81 ft



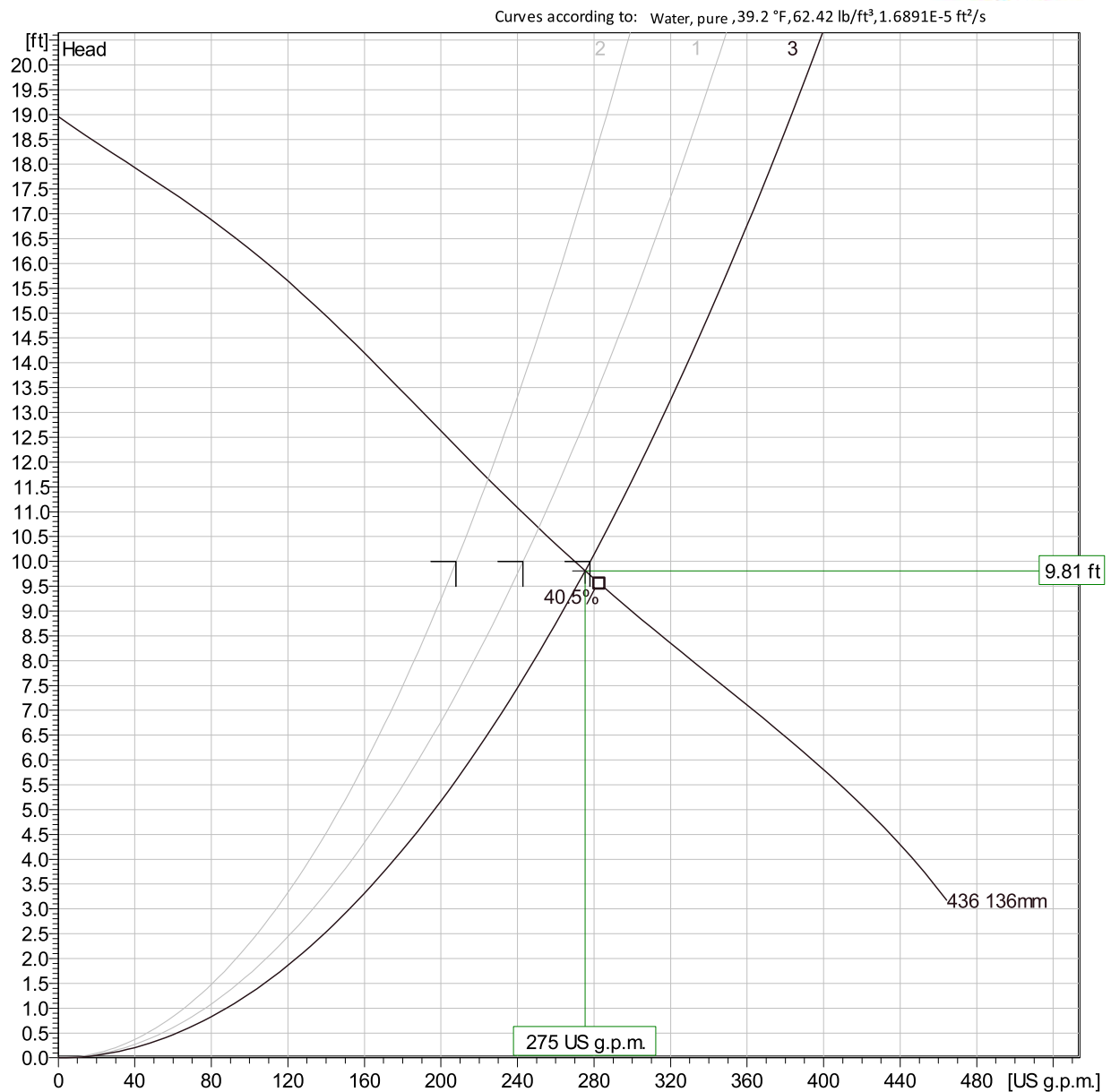
Project
Block

Created by Richard Kesseli
Created on 11/21/2022 Last update

11/21/2022

NP 3069 MT 3~ Adaptive 436

Duty Analysis



Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific Energy	NPSH _{re}
3	275 US g.p.m.	9.81 ft	1.69 hp	275 US g.p.m.	9.81 ft	1.69 hp	40.5 %	107 kWh/US M ³	16.6 ft
2	225 US g.p.m.	11.7 ft	1.72 hp	225 US g.p.m.	11.7 ft	1.72 hp	38.6 %	133 kWh/US M ³	16.6 ft
1	251 US g.p.m.	10.7 ft	1.7 hp	251 US g.p.m.	10.7 ft	1.7 hp	39.9 %	117 kWh/US M ³	16.5 ft

Project

Created by

Richard Kesseli

Block

Created on

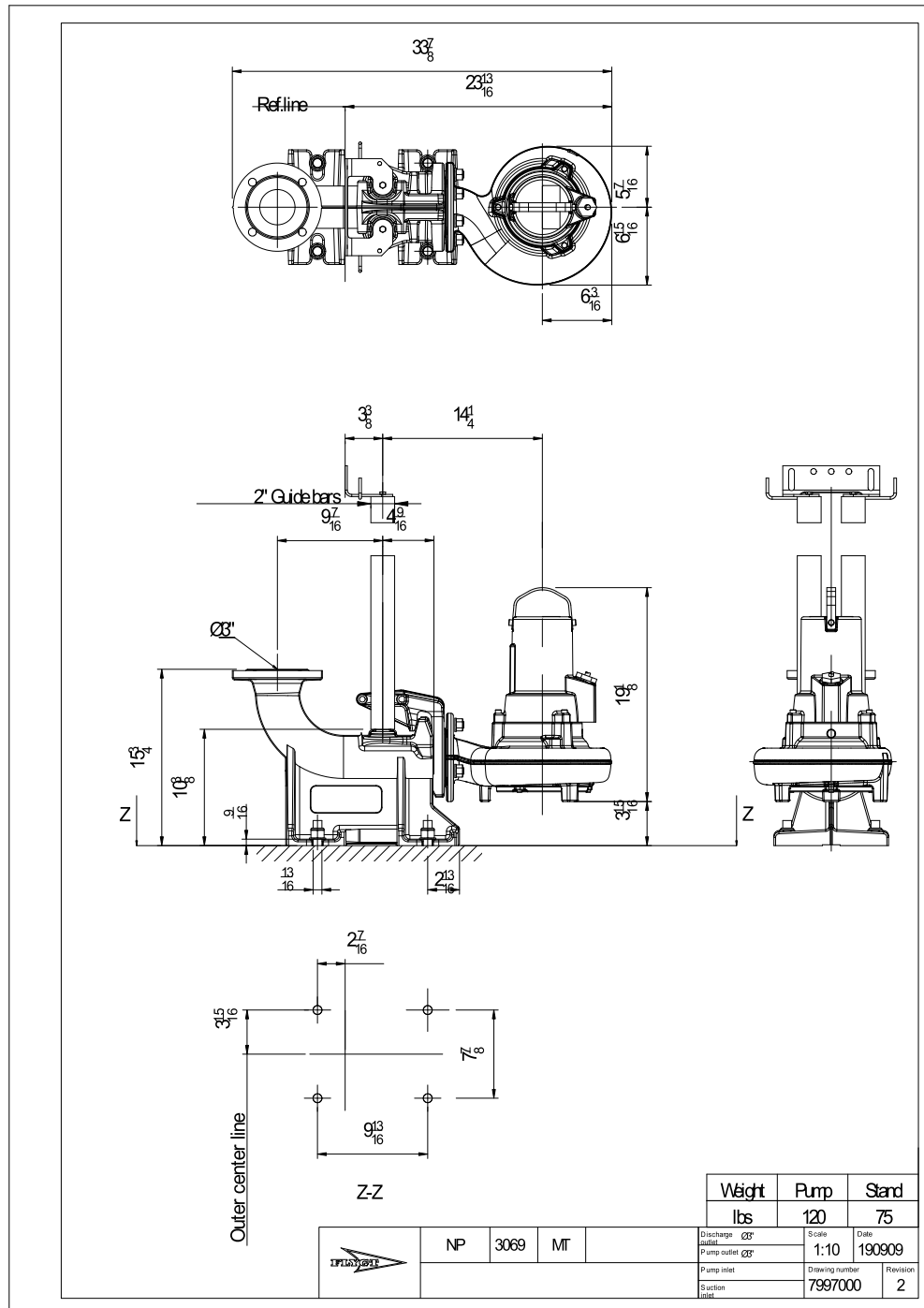
11/21/2022

Last update

11/21/2022

NP 3069 MT 3~ Adaptive 436

Dimensional drawing



Project
Block

Created by Richard Kesseli
Created on 11/21/2022 Last update

11/21/2022

Millington WWTP

Millington, MD

PREPARED FOR

AREA REPRESENTATIVE

Sherwood Logan & Associates
Patrick Foley
pfoley@sherwoodlogan.com

NOTE

//

PREPARED BY

Cedric Sirantoine
Phone (801) 931-3000
Fax (801) 931-3080
Cedric.Sirantoine@ovivowater.com

Ovivo USA, LLC
4246 Riverboat Road – Suite 300
Salt Lake City, Utah 84123-2583



Ovivo USA, LLC is pleased to submit this budget proposal for Millington WWTP.

Please contact Ovivo's sales representative in your area for any questions or comments you may have in connection with this proposal.

BUDGET PRICING

ITEM	SPECIFICATION SECTION	EQUIPMENT	PRICE
I	NONE	C4D SPIRAL BLADE CLARIFIERS	\$ 588,000

DESIGN CRITERIA

Number of Clarifiers	2
Clarifier Diameter:	40 ft
SWD:	15 ft
Freeboard:	2 ft
Clarifier Type:	C4D type spiral blade clarifier
Skimmer:	4' scum box

THIS BUDGETARY PROPOSAL CONSTITUTES A NON-BINDING ESTIMATE OF PRICE(S) FOR CERTAIN GOODS AND/OR SERVICES THAT MAY BE PROVIDED BY OVIVO USA, LLC FROM TIME TO TIME, BUT SHALL NOT BE CONSTRUED AS AN OFFER BY OVIVO USA, LLC TO PROVIDE SUCH GOODS AND/OR SERVICES

SCOPE OF SUPPLY

This budget price includes for one clarifier:

- Half-bridge walkway with 8' sq platform, with aluminum handrails and grating,
- C30HT Drive with strip liner bearing rated at 17,100 ft-lbs AGMA 20 years Cont. @ 0.05 rpm,
- 20" Influent column,
- 10' Flocculating feedwell,
- 5' Energy dissipating inlet well (EDI),
- Center cage,
- Sludge collection arms with spiral blades on both arms,
- Rotating sludge collection drum
- Surface scum skimming equipment (4' scum box with flush valve),
- Anchor bolts and assembly fasteners,
- Services 4d/2t,
- Drive finish painted per manufacturer standard painting scheme.
- Submerged and non-submerged steel will be 304 stainless steel.
- Freight FCA jobsite.
- O&M manuals

Items not included in the budget pricing:

- FRP weirs, baffles, and density current baffles
- Control panel, panel mounting plates or brackets, conduit, wiring, mounting channels, photocells, etc.
- Demolition or installation.
- Chemical feed lines
- Tank or tank modifications.
- Desludge system, valves, timers, etc.
- Unloading.
- Field welding.
- Finish painting.
- Lamp posts.
- Lubricants.
- Handrail or stairs approaching, outside of, or around tank.

THIS BUDGETARY PROPOSAL CONSTITUTES A NON-BINDING ESTIMATE OF PRICE(S) FOR CERTAIN GOODS AND/OR SERVICES THAT MAY BE PROVIDED BY OVIVO USA, LLC FROM TIME TO TIME, BUT SHALL NOT BE CONSTRUED AS AN OFFER BY OVIVO USA, LLC TO PROVIDE SUCH GOODS AND/OR SERVICES

ovivowater.com

CONFIDENTIAL



354 State Route 29, Greenwich, New York 12834
Phone No 518-695-6851
E-mail: dan@bdpindustries.com

Date: Thursday, November 10, 2022

To: KCI Technologies
1352 Marrows Road, Suite 100
Newark, DE 19711

Attn: Aaron Whitenight
(302) 318-1066
Aaron.whitenight@kci.com

Re: Kent County, MD WWTP
One (1) BDP 0.75m 3DP Belt Filter Press System
BDP Budget Proposal #: 1101022-1446

BDP Industries, Inc. is pleased to offer our quotation for one (1) 0.75m 3DP Belt Filter Press and accessories. Below is a summary of our scope of work.

EQUIPMENT DESCRIPTION

The Belt Filter Press equipment package includes one complete belt filter press and appurtenant equipment described as follows:

1. One (1) 316L stainless steel polymer injection and polymer/sludge mixing system consisting of an injection ring, variable vortex mixer and reducing fittings.
2. One (1) 0.75m 3DP, **3-belt**, belt filter press with the following design features:
 - a. Hot dipped galvanized steel tubular frame per **ASTM A123**.
 - b. Frame safety factor of 10.
 - c. Machined bearing pads.
 - d. Up-flow feedbox.
 - e. Variable speed paddle distributor wheel for feedbox.
 - f. Eight-foot **independent**, variable speed gravity section at operator level.
 - g. ¼" x 3" stainless steel gravity deck support spaced every 6 inches.
 - h. Six (6) rows of adjustable, furrowing plows with 316 stainless steel support bars.
 - i. Curved wedge section.
 - j. 304 stainless steel, 20" diameter, perforated roller.
 - k. Eight s-wrap pressure section.
 - l. UHMW scraper blades.
 - m. Nylon covered rollers.
 - n. 304 stainless steel wetted parts.
 - o. 304 stainless steel hardware.
 - p. **50 PLI** hydraulic tensioning and tracking.
 - q. Stainless steel Rack and Pinion tensioning in the pressure section.
 - r. Corrosion resistant composite cylinders with 316 stainless steel rods and stainless-steel hardware.
 - s. Self-cleaning, adjustable angle belt showers with Victaulic connections.
 - t. Double roller spherical bearings rated for 1,000,000 hours at 50 PLI at 15 ft/min.
 - u. TEFC, IP 65 severe duty variable speed motors.



354 State Route 29, Greenwich, New York 12834
Phone No 518-695-6851
E-mail: dan@bdpindustries.com

- v. PVC conduit.
 - w. Zero speed switches for the gravity and press belts.
 - x. NEMA 4X low voltage junction boxes.
 - y. 460/3/60
3. One (1) complete electrical control panel for dewatering system control functions and drives
- a. NEMA 4X
 - b. 304 Stainless Steel
 - c. Floor Mount
 - d. UL 508
 - e. PLC: Allen Bradley Compact Logix
 - f. HMI: Allen Bradley 12" Color PanelView Plus 7 OIT
 - g. VFDs and motor starters for the Belt Press drives and ancillary equipment.
 - h. Ethernet Communication
 - i. 460/3/60
 - j. Contains all interlocks and controls for the Belt Press and ancillary equipment.
4. One (1) 2 HP hydraulic power unit with a 20-gallon, 304 stainless steel reservoir.
5. One (1) 10 HP Goulds model 3656 wash water booster pump capable of boosting from 60 to 120 PSI at a flow rate of 35 GPM. The wash water system will include a low water pressure switch and solenoid valve.
6. All start-up, mechanical checkout and operator training as specified. Service to include three (3) separate trips with nine (9) days of on-site services.
7. One-year machine warranty. Three-year warranty for the frame, frame coating, bearings, rollers, roll coatings, and hydraulic unit.
8. One (1) lot of spare parts.
9. Freight to the jobsite.

Optional & Ancillary:

- 10. One (1) Automatic emulsion polymer make down unit with 5 GPH progressive cavity neat polymer pump and 1200 GPH dilution water capability
- 11. One (1) 4" Siemens magnetic flow meter with grounding rings and 30' of cable for remote digital display.
- 12. One (1) Seepex progressive cavity sludge feed pump with 7.5 HP TEFC drive motor capable of pump 100 GPM at 300 RPM and 60 PSI discharge pressure.

The model 3DP belt press will come completely factory-assembled, tested and will be shipped in two pieces. The polymer injection device, hydraulic unit, belt media, booster pump, polymer system, flow meter, VFDs, and electrical control panel will be shipped loose. All installation, on-site assembly, anchorage, pads and other work required to facilitate the setting of the equipment is to be by others. All labor and material for interconnecting between the press and the auxiliary equipment is to be completed by others.



354 State Route 29, Greenwich, New York 12834
Phone No 518-695-6851
E-mail: dan@bdpindustries.com

ITEMS NOT INCLUDED IN THIS SCOPE OF SUPPLY

1. Unloading at the jobsite.
2. Installation.
3. Temporary Dewatering Services.
4. Operator platforms.
5. Conveyance.
6. Sump grating.
7. Anchor bolts.
8. Applicable taxes of any kind.

SUBMITTAL DATA

Submittals will be made in the number of copies specified and will be available within 8 to 10 weeks after firm purchase order and all information is received at the factory.

SHIPMENT

Approximate shipping weight of the 0.75m Belt Press unit is 10,000 pounds. Estimated shipping time is 36 to 44 weeks after receipt of submittal approval.

FIELD SERVICE

Installation observation, testing and operator instruction services as listed above will be supplied. Additional service can be supplied at a service rate of \$1,400 per day plus travel expenses.

BUDGET PRICING

The total price for the above equipment is below in US dollars. This price includes the shipping cost to the job site or nearest unloading point. The price does not include unloading cost and applicable taxes of any kind. This quotation will be valid for sixty (60) days from the date of this proposal.

Qty.	Description	Unit Price
1	0.75m 3DP Belt Press - 50 PLI	\$260,000
1	PLC/OIT Control Panel	\$40,000
1	Booster Pump	\$7,500
1	Spare Parts	\$9,500
1	Freight	\$12,500
1	Start-up Services	\$16,500
	Total	\$346,000.00
	Optional & Ancillary	
1	Polymer Blending Unit	\$32,000
1	Flow Meter	\$5,500
1	Sludge Feed Pump & VFD	\$32,000



354 State Route 29, Greenwich, New York 12834
Phone No 518-695-6851
E-mail: dan@bdpindustries.com

TERMS

Terms of payment are 30% at submittal approval, 60% upon shipment of equipment, and 10% upon successful startup of the equipment. The attached Conditions of Sale are hereby made a part of this proposal.

We appreciate this opportunity to extend our quotation and if we can answer questions or supply additional information, please do not hesitate to contact Dave Kachman of Kappe Associates at 301-788-7132.

Sincerely,

Dan Fronhofer
BDP Industries, Inc.

cc: A.J. Schmidt, BDP Industries, Inc.
&
Dave Kachman CEO
Kappe Associates, Inc.
C# 301-788-7132

CONDITIONS OF SALE - COS 5-86

GENERAL -- This contract will exist between BDP Industries, Inc. (hereafter referred to as BDP) and the buyer only when accepted in writing by an officer of BDP. The prices quoted herein are firm for a period of 180 days if a contract is entered within thirty (30) days from the date on the face of this proposal. Any amendment to this contract must be in writing and acknowledged by both parties.

TERMS OF PAYMENT -- Payment is to be made on a net basis within thirty (30) days after invoice, subject to credit approval by BDP. The buyer's payment obligation is not dependent upon the buyer's receipt of payment from any other party. BDP reserves the right to invoice on partial shipments. Any balance owed by the buyer beyond thirty (30) days or more after due is subject to delinquency charges of 1.5% per month or any fraction thereof. This shall be in addition to any other amounts due and buyer shall reimburse BDP for all collection costs, including attorney's fees BDP may incur with respect to collection of past due amounts from the buyer.

TAXES -- This proposal does not include any Federal, State or Local Sales, Privilege, Use or any other taxes of any kind applicable to the sale of the equipment covered under this agreement. These taxes shall be paid by the buyer or the buyer shall provide BDP with a tax exemption certificate applicable to proper taxing authority.

SHIPMENT -- All shipment will be F.O.B. factory. Shipping estimates contained herein are based on time of receipt at BDP's factory of all details pertaining to the order which are essential to contract completion.

FORCE MAJEURE -- BDP shall not be liable for any loss or damage of any nature whatsoever incurred or suffered as a result of any failures or delays in performance due to any cause or circumstances beyond its, or its subcontractors' or suppliers' control, including, but not by way of limitation, failure or delays in performance caused by strikes, lockouts or labor disputes, acts of purchaser, fires, acts of God or the public enemy, riots, incendiaries, interferences by civil or military authorities, compliance with the laws of the United States or with the orders or policies of any Governmental authority, delays in transit or delivery on the part of transportation companies or communication facilities or failure of sources of raw material. In the event of such delay, the time of delivery or completion shall be extended by a period of time equal to the period of delay plus such time as needed for start-up and/or remobilization, provided however, should the Force Majeure situation extend beyond six months the contract may be canceled by either party. Purchaser shall reimburse BDP for all costs and expenses including overhead costs which BDP may have reasonably incurred in terminating the contract, plus an amount as reasonable profits on that portions to the contract which has been completed.

WARRANTY -- BDP warrants the equipment manufactured by it to be free from defects in materials and workmanship for a period of 18 months from the date of shipment or 12 months from the date of start-up, whichever occurs first. BDP will repair or replace, at its option, F.O.B. its factory, any defective part or material, provided prompt notification is rendered in writing. The repair or replacement of items such as light bulbs, grease, oil, drive belts or chains, pump seals, etc. are not covered by this warranty and are considered normal consumption and routine maintenance items. In addition to the replacement of defective parts, BDP will also provide such labor as it deems necessary, to repair a defect in the main frame structure. BDP will not assume the cost of any modification or repair of its equipment unless it specifically gives authority for such action. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL



354 State Route 29, Greenwich, New York 12834

Phone No 518-695-6851

E-mail: dan@bdpindustries.com

OTHERS. BDP MAKES NO WARRANTY AS TO FITNESS OF ITS PRODUCTS FOR PARTICULAR PURPOSE OR MERCHANTABILITY.

LIMITATION OF LIABILITY -- A. In no event, be it due to breach of any warranty hereunder or any other cause rising out of performance or non-performance of the obligations herein, whether any such breach or cause be or sound in tort, contract or otherwise, shall BDP be liable for indirect, special or consequential damages (such as, but not limited to, loss of profits, plant downtime, fines, penalties, or cost of replacement services) or sued by third parties against the purchaser (excluding suits regarding patents on title to the goods furnished hereunder). B. BDP's total cumulative liability for any and all reasons shall not exceed an amount equal to the contract price.

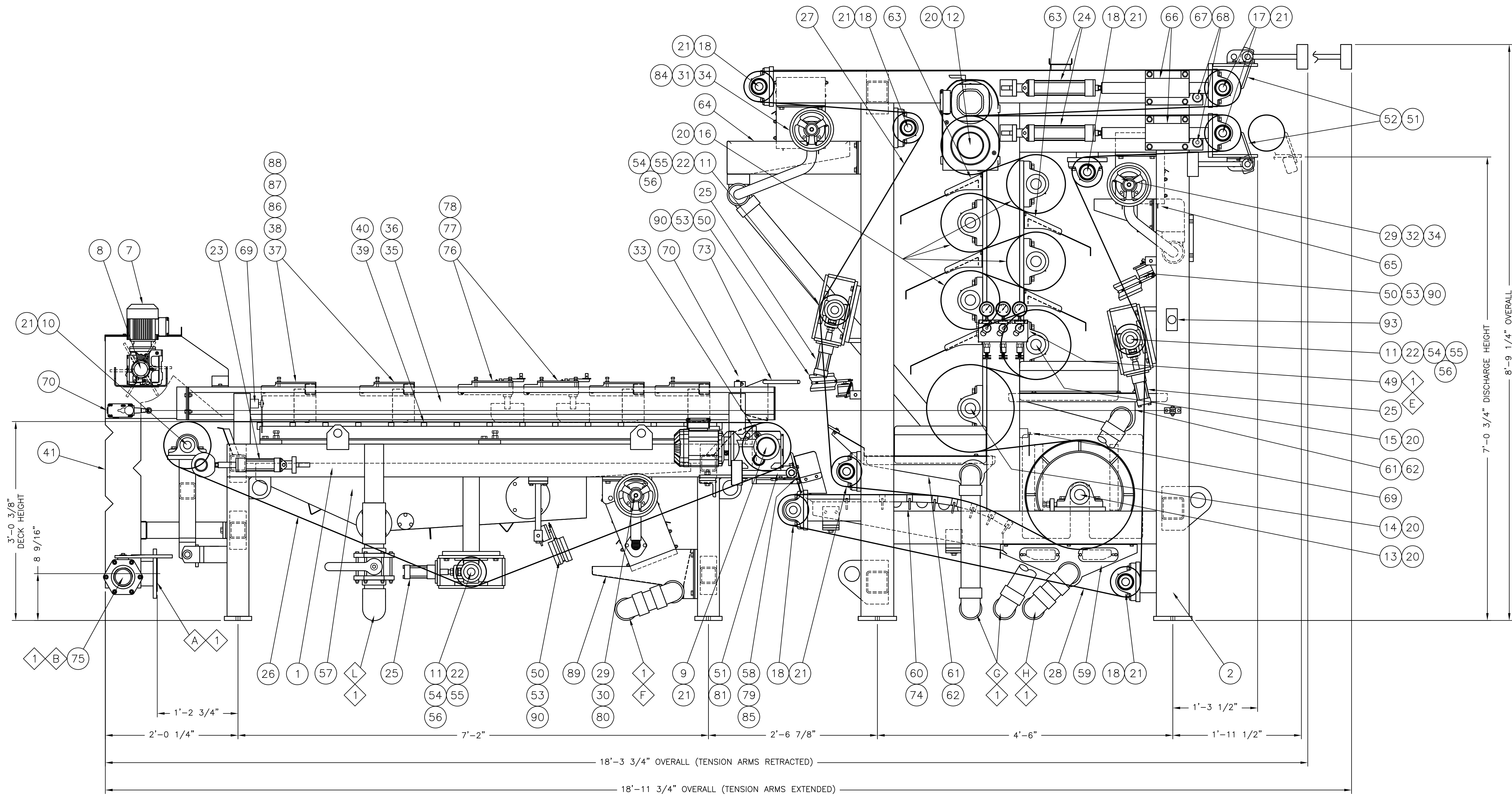
CLAIMS -- The buyer shall immediately inspect equipment within ten (10) days after receipt, BDP is not obligated to consider any claim for shortages or non-conformance unless notified by the buyer within ten (10) days after his receipt of the goods in question, BDP is not responsible for loss or damage in transit, however they will lend any possible assistance to the buyer in his pursuit of claim recovery.

CANCELLATION -- BDP will accept cancellation of this order upon receipt of payment for percentage of the contract equal to a percentage of the work completed. This shall be, at a minimum, 20% of the contract price.

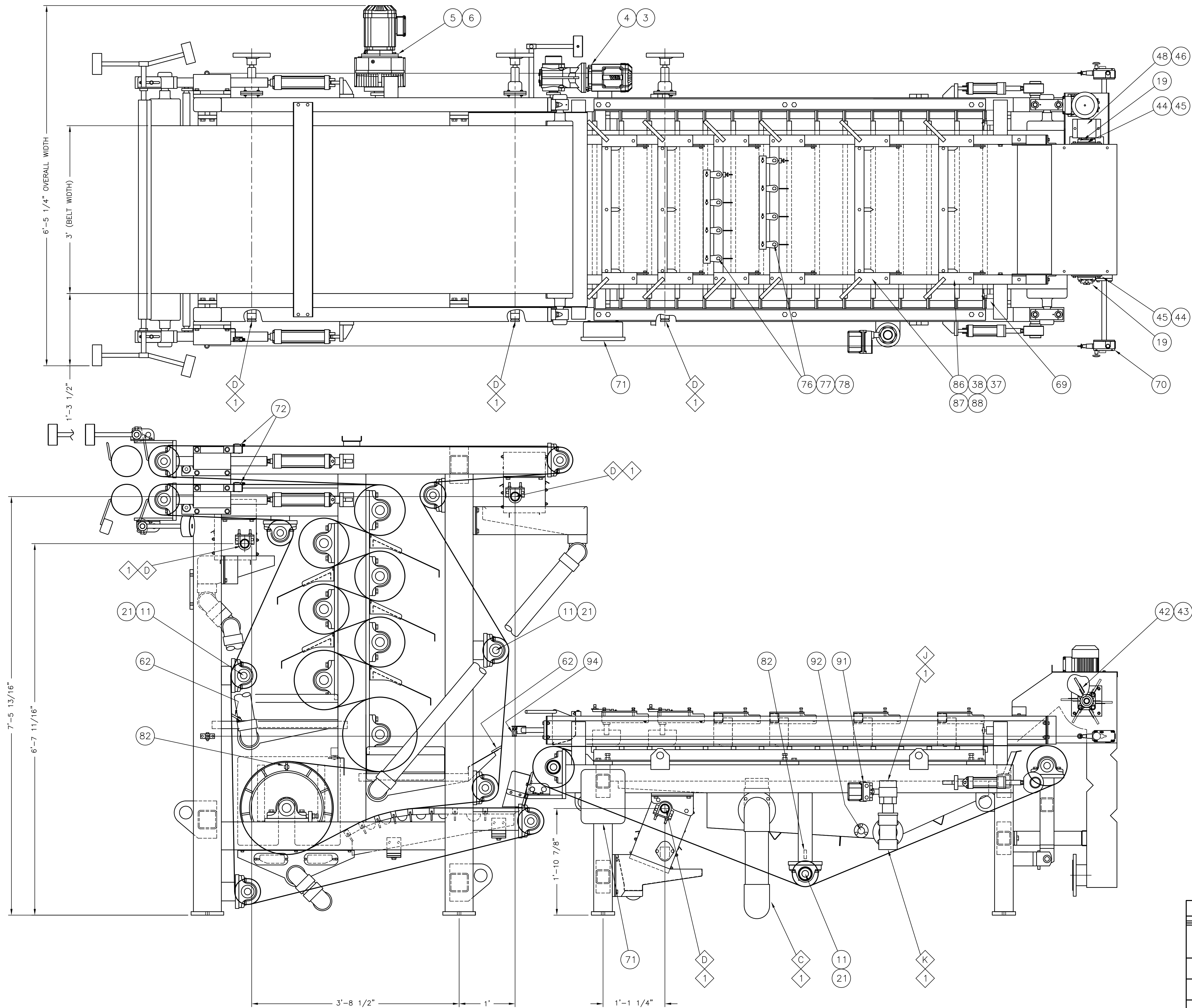
STORAGE -- If the buyer delays shipment, then the buyer agrees to pay all invoices as they become due. The buyer further agrees to pay, in addition, storage charges computed at 1.5% per month of the invoice price of equipment stored.

PERMITS -- The buyer shall assume full cost and responsibility to obtain all permits or licenses with respect to the installation and operation of the equipment covered under this agreement. This shall include all requirements by Federal, State and Local governmental bodies.

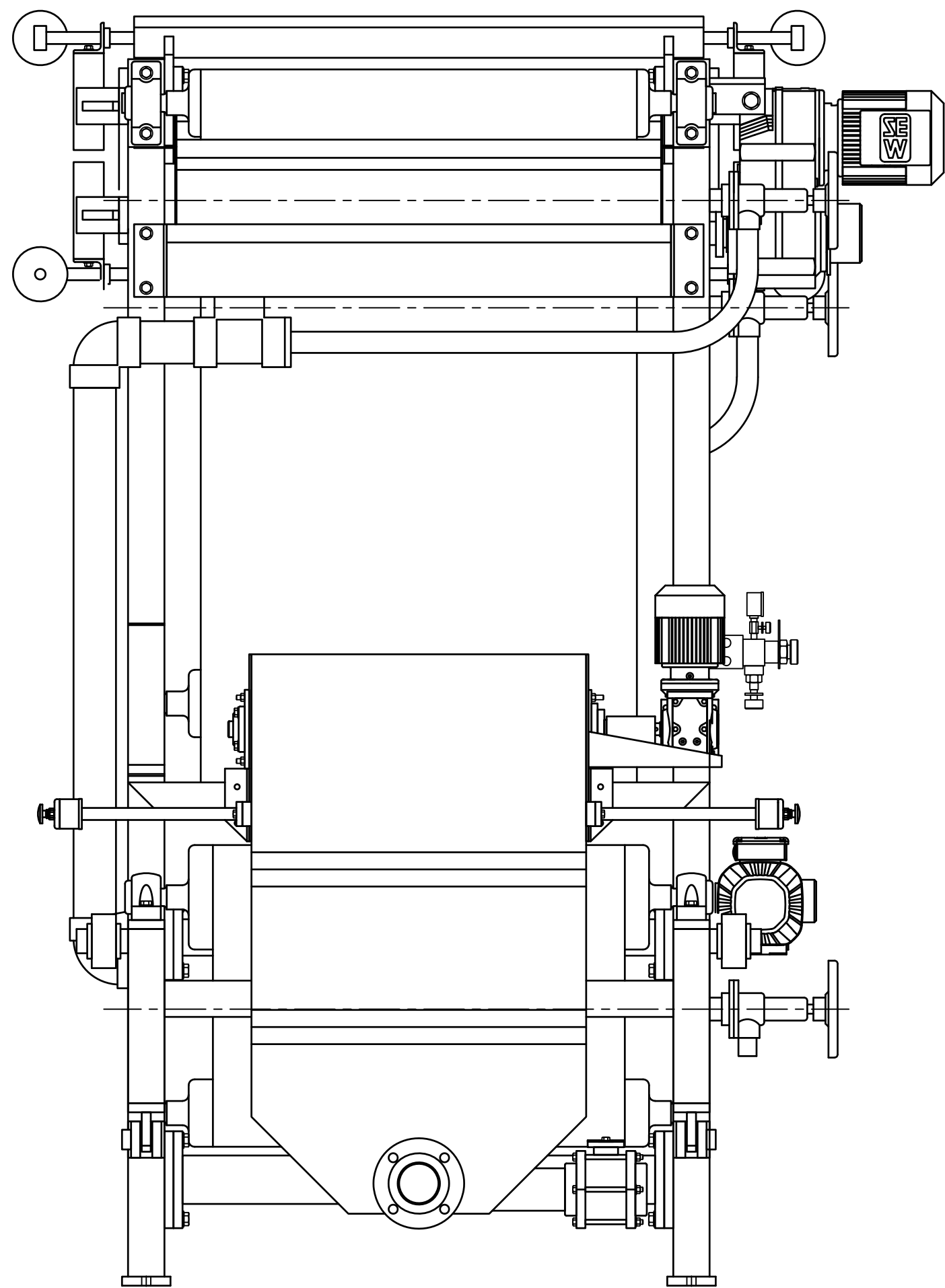
OTHER -- This contract shall be governed in accordance with the laws of the State of New York. These conditions and terms are the only terms and conditions that will be binding upon the parties unless amended, and acknowledged, in writing by both parties. No assignment of this proposal or any purchase order resulting here from shall be binding on BDP unless accepted in writing by BDP.



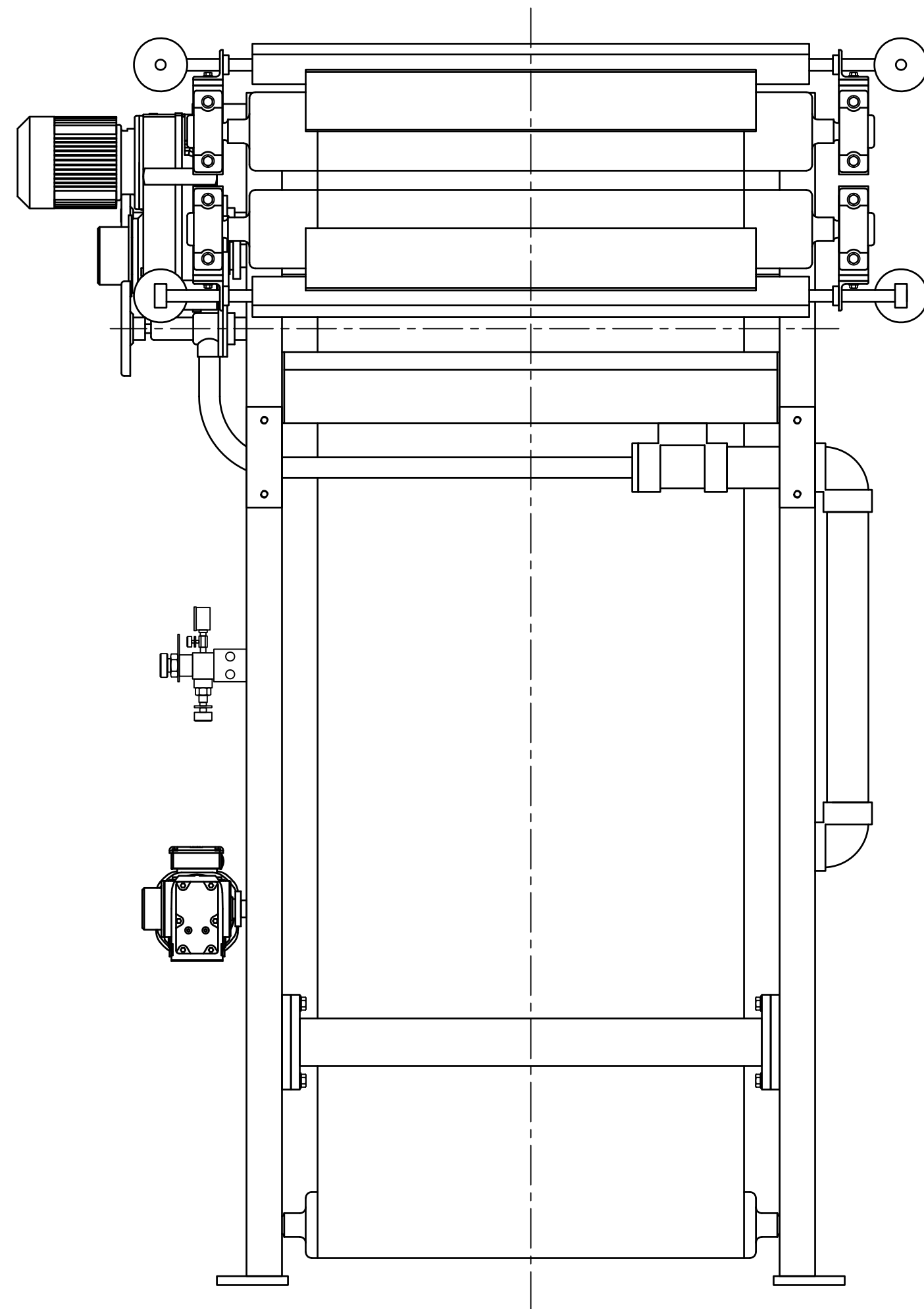
QTY.	DESCRIPTION	MAT.	ITEM	REMARKS
		BDP INDUSTRIES, INC. GREENWICH, N.Y. 12834		
CUSTOMER: WARSAW, NY		MACHINE: .75m 3DP		DWG TITLE GENERAL ARRANGEMENT .75m 3DP W/8' GBT
BDP JOB NO. 1570	DWN BY: SKD	DATE: 1/18/21		
APPD BY:	SCALE:	SHT. OF 1 4	DWG NO. 1-1570-1	REV. 1



QTY.	DESCRIPTION	MAT.	ITEM	REMARKS
		BDP INDUSTRIES, INC. GREENWICH, N.Y. 12834		
CUSTOMER: WARSAW, NY		MACHINE: .75m 3DP		DWG TITLE GENERAL ARRANGEMENT .75m 3DP W/8' GBT
BDP JOB NO. 1570	DWN BY: SKD	DATE: 1/18/21		
APPD BY:	SCALE:	SHT. OF 2 4	DWG NO. 1-1570-1	REV. 1

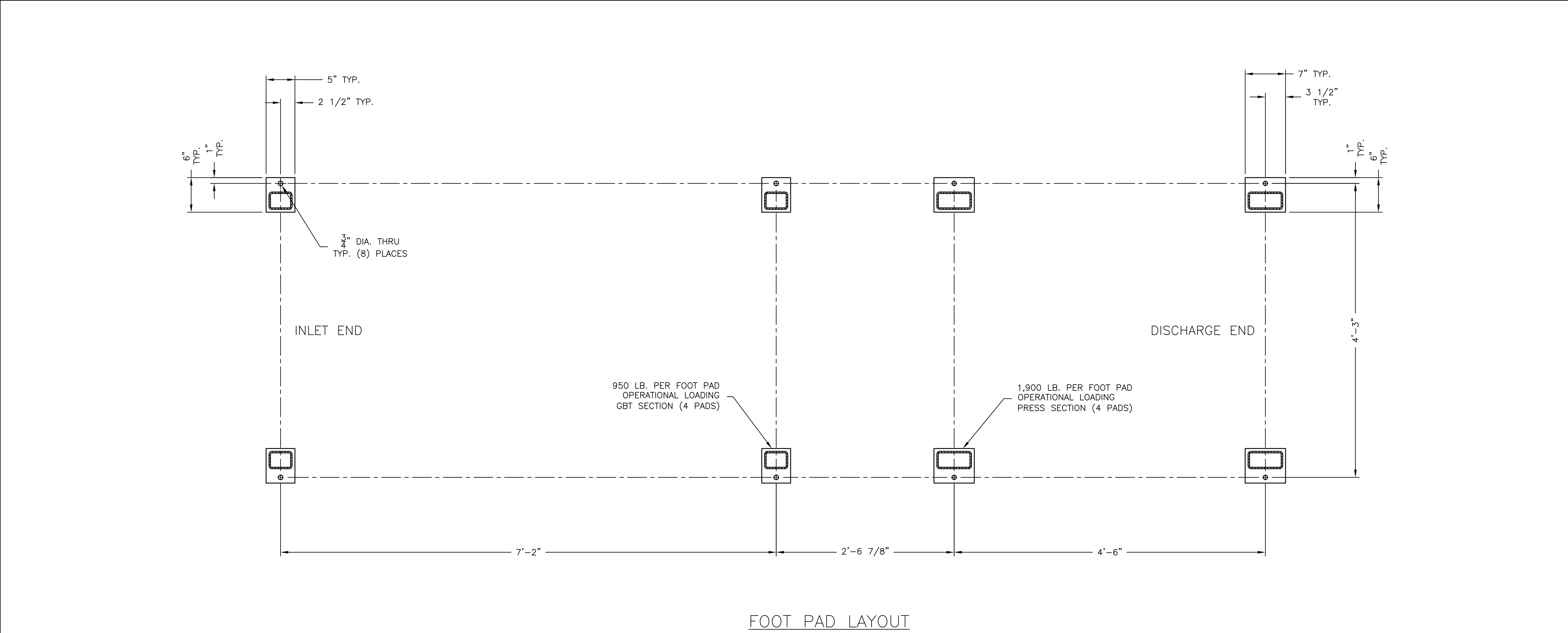


INLET END VIEW



DISCHARGE END VIEW

QTY.	DESCRIPTION			MAT.	ITEM	REMARKS
				BDP INDUSTRIES, INC. GREENWICH, N.Y. 12834		
CUSTOMER: WARSAW, NY		MACHINE: .75m 3DP		DWG TITLE GENERAL ARRANGEMENT .75m 3DP W/8' GBT		
BDP JOB NO. 1570	DWN BY: SKD	DATE: 1/18/21				
APP'D BY:	SCALE:	SHT. OF 3 4	DWG NO. 1-1570-1			REV. 1



FOOT PAD LAYOUT

NOTES:

- 1 PIPING BEYOND THIS POINT INDEPENDENTLY SUPPORTED (NOT BY BDP).
2. FRAME IS HOT DIP GALVANIZED PER ASTM A123.
3. ALL STAINLESS STEEL SHEET AND PLATE IS TYPE 304 SS.
ALL FASTENERS AND HARDWARE IS TYPE 304 SS.
4. ITEMS NOT OTHERWISE PROTECTED ARE COATED WITH 8 MILS NAPA URETHANE ENAMEL PER BDP SPECIFICATION QA94-006.
5. HYDRAULIC TUBING AND FITTINGS ARE 316 STAINLESS STEEL.
6. APPROXIMATE WEIGHTS: GBT: 2,300 LBS. DRY
3,200 LBS. OPERATING
PRESS: 6,600 LBS. DRY
7,200 LBS. OPERATING
7. ELECTRICAL CONDUIT IS PVC.
8. GEARMOTOR; KT47DRN80M4-IP66, 1 HP, 75.02:1, 480V, 1.4375" BORE, NON-SYMMETRICAL, M1A MOUNT, CONDUIT BOX @ 270°, CABLE ENTRY 'X'
9. GEARMOTOR; FT77DRN90L4-IP66, 2 HP, 188.40, 480V, 1.9375" BORE, NON-SYMMETRICAL, M1A MOUNT, CONDUIT BOX @ 0°, CABLE ENTRY 'X'
10. GEARMOTOR; S47DRN71MS4-IP66, 1/3 HP, 54.59:1, 480V, 1" OUTPUT SHAFT, M4 MOUNT, SHAFT SIDE 'B', CONDUIT BOX @ 90°, CABLE ENTRY '1'
11. S000170, 2" BORE x 4" STROKE, MP1 MOUNT, COMPOSITE BODY AND HEADS, 316SS ROD, SAE -6 PORTS, STANDARD PISTON, HYDRAULIC DUTY
12. S000171, 2.5" BORE x 8" STROKE, MP1 MOUNT, COMPOSITE BODY AND HEADS, 316SS ROD, SAE -6 PORTS, STANDARD PISTON, HYDRAULIC DUTY
13. S000164, 2" BORE x 2" STROKE, MF1 MOUNT, COMPOSITE BODY AND HEADS, 316SS ROD, SAE -6 PORTS, STANDARD PISTON, HYDRAULIC DUTY

CONNECTION LEGEND:

- 4" 150# FLANGED FEED INLET
- 3" FEED BOX DRAIN
- 4" GBT MAIN COLLECTION PAN OVERFLOW
- (3) 1-1/2" VICTAULIC SHOWER INLET
- 1/2" SAE-8 HYDRAULIC MANIFOLD INLET/RETURN
- 3" GBT SHOWER COLLECTION PAN DRAIN
- (2) 3" COMPRESSION PAN OUTLET
- (2) 3" PERFORATED PAN OUTLET
- 1-1/2" NPT WATER INLET
- 3" NPT RECYCLED FILTRATE TO PUMP
- 3" GBT MAIN COLLECTION PAN DRAIN

1	WEDGE LEVEL SENSOR	A.B.	94	45DMS-B8LGT1-D5
1	CONVEYOR SPEED CONTROL	PNEU-TROL	93	N3OSSK
1	FILTRATE LEVEL TRANSDUCER	PMC	92	
1	ELECTRIC BALL VALVE	TRIAC	91	22-TX-150/WEA1-XX
3	ALIGNING PADDLE WEAR PLATE	316 SS	90	3-710-1000 P2
1	GBT SHOWER COLLECTION PAN	304 SS	89	
4	EXCELSIOR PLOW UPRIGHT, LEFT	UHMW	88	3-310-790 P3
4	EXCELSIOR PLOW UPRIGHT, RIGHT	UHMW	87	3-310-790 P2
4	EXCELSIOR PLOW UPRIGHT, CENTER	UHMW	86	3-310-790 P1
2	TRANSITION SIDE DEFLECTOR SEAL	RUBBER	85	3-710-1600
2	SHOWER W/CHAIN WHEEL, PRESS	APPLETON	84	148902
			83	
2	BELT ZERO SPEED SWITCH	A. B.	82	871TM-BH8N18-H2
1	GBT DOCTOR BLADE	UHMW	81	3-310-1305 (P1)
4	GBT SHOWER SEAL	RUBBER	80	3-710-1596 (P2)
2	TRANSITION SIDE DEFLECTOR	304 SS	79	GBT
8	PIVOT PLOW LEVER	POLY-E	78	450510
8	PIVOT PLOW BLADE	POLY-E	77	240560
2	PIVOT PLOW ASSEMBLY	STEEL	76	GALVANIZED
1	3" BALL VALVE	PVC	75	
8	WEDGE SLIDE BAR	UHMW	74	3-710-994 (P7)

1	SLUDGE REDISTRIBUTION FLAP	304 SS	73	
2	BELT TENSION LASER SENSOR	A.B.	72	45DMS-B8LGT1-D5
1	ELECTRICAL JUNCTION BOX	FRP	71	
2	EMERGENCY STOP ASSEMBLY	A. B.	70	440E-L13133
4	BELT MISALIGNMENT SWITCH	A. B.	69	802MC-AY5
4	TENSION GEAR BEARING BAR	304 SS	68	3-710-1429 G1
4	TENSION ASM. PINION GEAR	303 SS	67	3-710-633
2	TENSION ASSEMBLY	STEEL	66	
1	LOWER SHOWER DRIP PAN	304 SS	65	
1	UPPER SHOWER DRIP PAN	304 SS	64	
5	DRIP DEFLECTION PAN	304 SS	63	
2	DRIP PAN BELT SCRAPER	UHMW	62	3-710-668
2	COMPRESSION SECTION PAN	304 SS	61	
1	CURVED WEDGE ASSEMBLY	304 SS	60	
1	PERF. ROLL DRIP PAN	304 SS	59	(2) 3" OUTLETS
1	TRANSITION SEAL	RUBBER	58	3-310-1305 (P2)
1	GBT COLLECTION PAN	304 SS	57	
3	ALIGNING BEARING SLED	304 SS	56	3-310-1095 G2
3	ALIGNING BEARING SLIDE	UHMW	55	3-710-592 P1
3	ALIGNING BEARING GUIDE	BRASS	54	3-710-592 P2
3	BELT ALIGNING PADDLE	316SS	53	3-710-1000 (P2)
2	PRESS DOCTOR BLADE	UHMW	52	3-310-98 (P6)
3	DOCTOR BAR ASSEMBLY	304 SS	51	
3	BELT ALIGNING VALVE	MICROTORK	50	375SST
1	HYDRAULIC VALVE STATION	R.W. EARL	49	09194A
1	COUPLING INSERT	LOVEJOY	48	EDP11070
			47	
2	FEEDBOX PADDLE HALF COUPLING	LOVEJOY	46	EDP11091
2	PADDLE BEARING ISOLATOR	UHMW	45	3-310-645
2	PADDLE SHAFT SEAL	HARWALL	44	1.000 1.500 .250ADL
6	DISTRIBUTION PADDLE FLAP	RUBBER	43	3-310-591
1	DISTRIBUTION BOX PADDLE	304 SS	42	
1	GBT DISTRIBUTION BOX	304 SS	41	4" FEED INLET
15	GRAVITY SLIDE BAR	UHMW	40	3-310-91 (P7)
1	SLIDE BAR SUPPORT ASSEMBLY	304 SS	39	ADJUSTABLE HEIGHT
8	EXCELSIOR PLOW BLADE	UHMW	38	3-310-794 P3
4	EXCELSIOR PLOW ASSEMBLY	STEEL	37	GALVANIZED
2	GUIDE RAIL SEAL	RUBBER	36	3-310-609 (P2)
2	GUIDE RAIL ASSEMBLY	304 SS	35	
8	PRESS SHOWER SEAL	RUBBER	34	3-710-1596 (P2)
1	GBT DRIVE ROLL SEAL	RUBBER	33	3-310-587 (P6)
1	PRESS SHOWER ENCLOSURE	304 SS	32	LOWER BELT
1	PRESS SHOWER ENCLOSURE	304 SS	31	UPPER BELT
1	GBT SHOWER ENCLOSURE	304 SS	30	
1	GBT BELT WASH SHOWER	APPLETON	29	139565
1	LOWER PRESS BELT; 36" x 565"	CLEAR EDGE	28	HF7-7051, #1 SEAM
1	UPPER PRESS BELT; 36" x 568"	CLEAR EDGE	27	HF7-7051, #1 SEAM
1	GBT BELT; 34" x 247"	CLEAR EDGE	26	HF7-7030, #1 SEAM
3	ALIGNING CYLINDER	SPRINGVILLE	25	NOTE 13
4	TENSION CYLINDER, PRESS	SPRINGVILLE	24	NOTE 12
2	TENSION CYLINDER, GBT	SPRINGVILLE	23	NOTE 11
3	1-7/16" TAKE-UP BEARING	LINKBELT	22	TB22423E7E7CSS
23	1-7/16" UNIBLOCK BEARING	LINKBELT	21	PB22423E7E7CSS
16	1-15/16" UNIBLOCK BEARING	LINKBELT	20	PB22431E7E7CSS
2	1" 4-BOLT FLANGE BEARING	LINKBELT	19	F3U216E3
6	6" IDLER ROLL, PRESS	NYLON	18	3-710-1908
2	7" TENSION ROLL, PRESS	NYLON	17	3-710-1909
4	11" COMPRESSION ROLL, PRESS	NYLON	16	3-710-1910
1	13" COMPRESSION ROLL, PRESS	NYLON	15	3-710-1911
1	16" COMPRESSION ROLL, PRESS	NYLON	14	3-710-1912
1	20" PERFORATED ROLL	304 SS	13	2-710-186 (G1)
1	11" DRIVE ROLL, PRESS	EAA	12	3-710-1913
3	6" ALIGNING ROLL	EAA	11	3-710-1897
1	9" TENSION ROLL, GBT	NYLON	10	3-310-1879
1	9" DRIVE ROLL, GBT	EAA	9	3-310-1880
1	FEEDBOX REDUCER	SEW	8	NOTE 10
1	FEEDBOX DRIVE MOTOR	SEW	7	NOTE 10
1	PRESS REDUCER	SEW	6	NOTE 9
1	PRESS DRIVE MOTOR	SEW	5	NOTE 9
1	GBT REDUCER	SEW	4	NOTE 8
1	GBT DRIVE MOTOR	SEW	3	NOTE 8
1	PRESS TUBULAR STEEL FRAME	A500GR.B	2	GALVANIZED
1	GBT TUBULAR STEEL FRAME	A500GR.B	1	GALVANIZED
QTY.	DESCRIPTION	MAT.	ITEM	REMARKS

		BDP INDUSTRIES, INC. GREENWICH, N.Y. 12834	
CUSTOMER: WARSAW, NY		MACHINE: .75m 3DP	
BDP JOB NO. 1570		DWN BY: SKD	
DATE: 1/18/21			
APPD BY:		SCALE:	
		SHT. OF 4 4	
REV.	DESCRIPTION	DATE	BY

Millington WWTP, MD

CONTINUOUS BACKWASH DENITRIFICATION FILTER SYSTEM

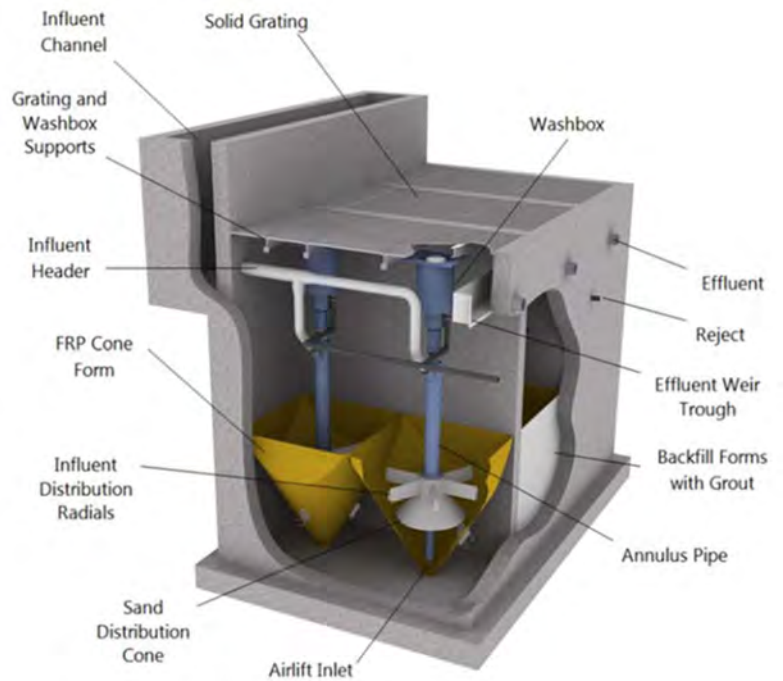
Evoqua Denitrification Filter Budget Proposal

Quotation No. 00523834 R1

Aaron Whitenight
KCI TECHNOLOGIES INC.
1352 Marrows Road, Suite 100,
Newark, DE 19711
302.463.9317
Aaron.Whitenight@kci.com

Evoqua Representative
Tom Rainier
Riordan Materials Corporation
8712 Inwood Rd
Windsor Mill, MD 21244
410-440-4411
trainier@riordanmat.com

Miguel Gutierrez
229 516 5286
miguel.gutierrez@evoqua.com



There is a need to provide tertiary treatment to reduce total suspended solids and total nitrogen from an equalized secondary treated effluent from an Evoqua's SBR Omniflo® treatment system. The treatment goal basis is described as follows:

Flow Design Conditions	Scenario 1	Scenario 2	units
Proposed Avg. Daily Flow	0.35	0.60	mgd
Proposed Peak Daily Flow	1.00	1.57	mgd
Proposed Peak Hourly Flow	1.33	2.09	mgd
Proposed Max Monthly Flow	0.67	1.05	mgd
Influent Characteristics			
TSS	10.0 – 20.0		mg/l
TP	0.5 – 1.5		mg/l
TN	≤ 8.0		mg/l
N-NOx	≤ 12.0		mg/l
N-NH3	≤ 1.0		mg/l
DO	≤ 2.0		mg/l
Min. Temperature	12		C
Effluent Characteristics*			
BOD (insoluble)	≤ 10.0		mg/l
TSS	≤ 10.0		mg/l
TN	≤ 3.0		mg/l
TP	≤ 0.3		mg/l
Fecal Coliforms	< 200		mg/l

* In-Line chemical conditioning will be required to achieve stated performance

Evoqua Water Technologies proposes the modular design of its CBF technology Model CB 929-30 to be inserted into concrete basins (by others). Each filter module will have an approximate footprint of 10 ft. x 10 ft. and a bed depth of 120 in. Evoqua proposes the following configuration based on the flow design considerations of the table above.

Flow Design Conditions (mgd)	Scenario 1	No. Modules	Scenario 2	No. Modules
Proposed Avg. Daily Flow	0.35	1	0.60	2
Proposed Peak Daily Flow	1.00	2	1.57	3
Proposed Peak Hourly Flow	1.33	3	2.09	4
Proposed Max Monthly Flow	0.67	2	1.05	3

Quote No. 00523834 R1

Millington WWTP MD
Denitrification Filters

August 26, 2022

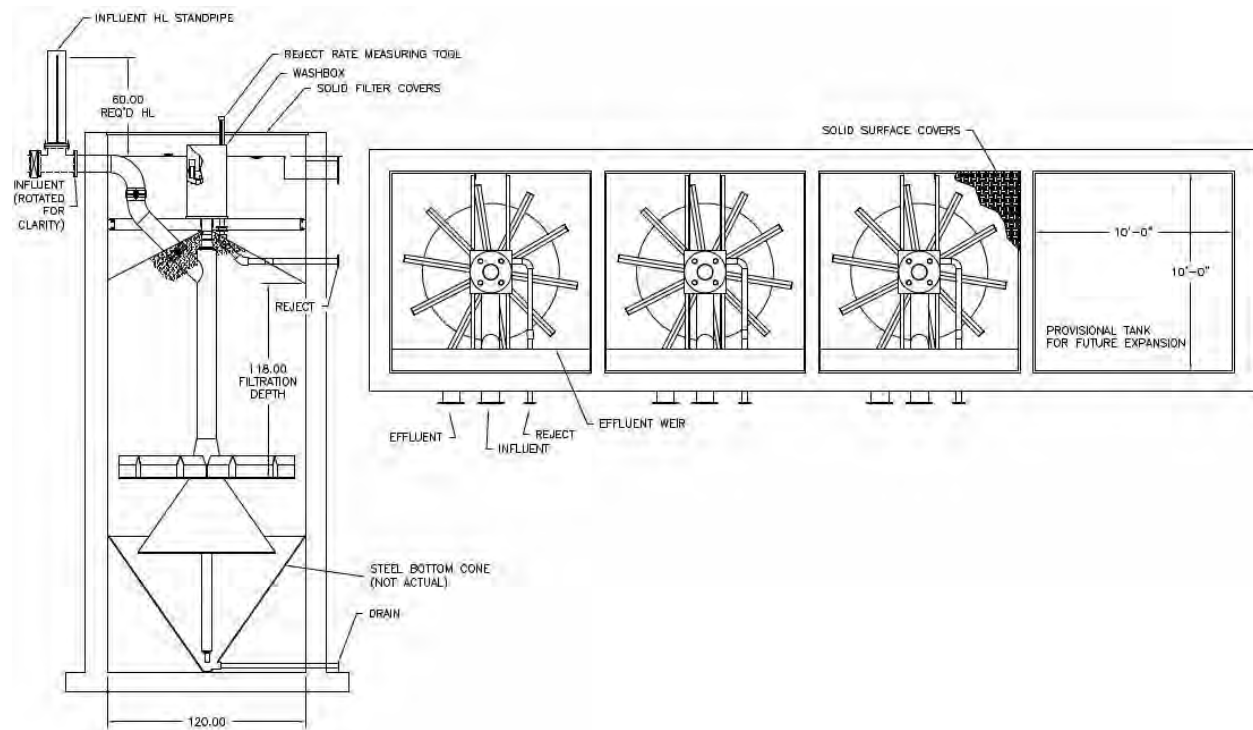
Process Calculations for Scenarios described above:

Scenario 1 - New Plant

Unit Surface Area (sq.ft.)	100.0											
Reject flow per module (gpm)	15							Bed depth (meter)				
No. modules per cell	1							3.0				
Flow	MGD	gpm	No. of cells	Total No. of filters	Hydraulic load (gpm/sq.ft.)	Solids load (lb/sq.ft.*day)	N-NOx load (lb/1000 cu.ft.*day)	N-NOx load (kg/m3 day)	Est. Headloss (in)	Total reject flow (gpm)	Percent of reject flow (%)	
PROPOSED AVERAGE DAILY FLOW (ADF)	0.35	243.1	1	1	2.4	0.73	44.51	0.71	18.0	15.0	6.2%	
(with one filter cell out of service)			Not Applicable									
PROPOSED PEAK DAILY FLOW (PDF)	1.00	694.4	2	2	3.5	1.04	63.58	1.02	25.3	30.0	4.3%	
(with one filter cell out of service)			1	1	6.9	2.09	127.17	2.04	49.6	15.0	2.2%	
PROPOSED MAX MONTHLY FLOW	0.67	465.3	2	2	2.3	0.70	42.60	0.68	17.3	30.0	6.4%	
(with one filter cell out of service)			1	1	4.7	1.40	85.20	1.36	33.5	15.0	3.2%	
PROPOSED PEAK HOURLY FLOW (PHF)	1.33	923.6	3	3	3.1	0.92	56.38	0.90	22.5	45.0	4.9%	
(with one filter cell out of service)			2	2	4.6	1.39	84.57	1.35	33.3	30.0	3.2%	

Scenario 2 - Expanded Plant

Unit Surface Area (sq.ft.)	100.0											
Reject flow per module (gpm)	16							Bed depth (meter)				
No. modules per cell	1							3.0				
Flow	MGD	gpm	No. of cells	Total No. of filters	Hydraulic load (gpm/sq.ft.)	Solids load (lb/sq.ft.*day)	N-NOx load (lb/1000 cu.ft.*day)	N-NOx load (kg/m3 day)	Est. Headloss (in)	Total reject flow (gpm)	Percent of reject flow (%)	
PROPOSED AVERAGE DAILY FLOW (ADF)	0.60	416.7	2	2	2.1	0.63	38.15	0.61	15.6	32.0	7.7%	
(with one filter cell out of service)			1	1	4.2	1.25	76.30	1.22	30.1	16.0	3.8%	
PROPOSED PEAK DAILY FLOW (PDF)	1.57	1090.3	3	3	3.6	1.09	66.55	1.07	26.4	48.0	4.4%	
(with one filter cell out of service)			2	2	5.5	1.64	99.83	1.60	39.1	32.0	2.9%	
PROPOSED MAX MONTHLY FLOW	1.05	729.2	3	3	2.4	0.73	44.51	0.71	18.0	48.0	6.6%	
(with one filter cell out of service)			2	2	3.6	1.10	66.76	1.07	26.5	32.0	4.4%	
PROPOSED PEAK HOURLY FLOW (PHF)	2.09	1451.4	4	4	3.6	1.09	66.45	1.06	26.4	64.0	4.4%	
(with one filter cell out of service)			3	3	4.8	1.45	88.59	1.42	34.8	48.0	3.3%	

Possible Layout:**Process description**

The CBS Denitrification filtration system is a new and improved continuous sand filter, developed for physical-chemical and biological treatment of different types of water, such as process, waste, surface, cooling, and ground water. The filtration process of the CBS Denitrification filter system is comparable to fixed bed filters in that it removes particulate material and provides the volume bed for the denitrifying bacteria to reduce nitrates to nitrogen gas. However, its technology offers some distinct advantages. The CBS filter operates under a constant backwash mode, continuously cleaning the filter bed without shedding off excess biomass. This self-cleaning, continuous process allows for consistently high filtrate quality and maintains the necessary inventory of denitrifying bacteria for the process. Unlike conventional filtration with starting and stopping of backwash cycles which are susceptible to increases in flow and loading rates, the continuous wash water flow of the CBS filter is independent of the suspended solids load, the hydraulic load, or the need for nitrogen release bump cycles.

Influent wastewater water is transported into the filter by means of the feed pipeline. Water enters the filter bed through the filter standpipe and the distribution radials. The water is filtered as it flows upward through the filter. As an attached growth process, the denitrifying bacteria resides in the crevices of the denitrifying media. Nitrates are reduced to



nitrogen gas in an anoxic environment within the filter and the inline addition of a suitable carbon source. The clean – reduced nitrate filtrate is discharged from the top of the filter. Nitrogen gas is released into the atmosphere. The filter bed moves downward as the water flows up. Dirty sand is continuously extracted from the sand bed and washed by a sand washer section of the washbox. Excess biomass growth is removed from the sand grains, after which it falls back to the top of the filter bed. The sand circulation is based on the airlift principle, forcing a mixture of dirty sand and water upward through a central pipeline. Intensive scouring movements separate the solids from the sand particles. At the top of the pipeline the air is released, and the dirty water is discharged. The sand washer at the top of the filtration tank washes the sand with a small amount of clean filtrate. This removes the final traces of pollutant from the sand. Flow is achieved through a difference in level between the filtrate and the wash water.

Equipment Description (Evoqua Scope of Supply):

1. Three (3) CBS Denitrification Filter modules Model CB-929-30 arranged in a configuration of three (3) filter cells of one (1) filter module each. Each filter module provides 100 sq.ft. of filtration area. Each module consists of the following:
 - (i) Bottom Hopper Cone.
 - (ii) Airlift assembly.
 - (iii) Washbox assembly (completely fabricated as a single piece, not onsite construction required) Includes adjustable reject weirs and washer section, etc. and airlift hold down system eliminating the possibility of a floating airlift.
 - (iv) Influent Annulus distribution housing.
 - (v) Influent distribution radials.
 - (vi) Sand distribution cone.
 - (vii) Lower center pipe (prevents short circuiting of influent)
2. Three (3) Influent Feed Manifolds
3. Denitrification Filter media as defined below.
4. Compressor System consisting of:
 - (a) Two (2) (1 duty – 1 standby) Ingersoll Rand Screw Compressor system - 15.0 HP 120-Gallon (208V 3-Phase 125 PSI)
 - (b) Pre and post oil filters
 - (c) Refrigerated air dryer
5. Three (1) Pneumatic Control Panels for the independent control of each filter cell and to include bump solenoid to ensure proper airlift operation at startup, automatic filter operation based on flow over the effluent weir, HOA switches for off, manual, and automatic modes of operation.
6. Three (3) level probe assembly.



7. Three (3) sets of aluminum plank grating and supports to cover each filter cell.
8. One (1) lot of spare parts including regulator, rotameter, filter elements, synthetic oil for compressor and miscellaneous spare parts for control panels.
9. Equipment Start up
10. Twelve (12) month standard equipment warranty as defined in the terms and conditions below.
11. Equipment Submittals and Operation and Maintenance Manuals.

Materials of Construction:

- | | |
|----------------------|----------------------------------|
| 1. Basins | Concrete (by others) |
| 2. Washbox | 304SS / HDPE |
| 3. Air Lift Pipe | HDPE |
| 4. Internals | 304SS / PVC / FRP / HDPE |
| 5. Internal Hardware | 304SS |
| 6. Cover | Aluminum Unpunched Plank Grating |
| 7. Control Panels | 304SS |

Denitrification Filter Media by Evoqua

- | | |
|--|-----------------|
| 1. Type: | Sand |
| 2. Filtration depth: | 120 in. |
| 3. Effective size: | 1.15 – 1.3 mm |
| 4. Uniformity coefficient: | < 1.5 |
| 5. Shipping weight: | Approx. 90 tons |
| 6. All media will conform in all respects to the latest edition of AWWA B-100. | |

Equipment Provided by Others

Concrete work
 Access ladders/ stairways, handrails or grating (if not included herein)
 Intermediate walkways
 Equipment and media installation
 Equipment pads
 Interconnecting piping - Influent and effluent piping
 Chemical feed equipment, pumps, piping, etc.
 Feed/Drain valves unless specified herein.
 Feed/Effluent pumps
 Chemical feed PLC based control panel unless described herein.
 Instrumentation
 Chemical storage
 Pneumatic piping
 Conduit and wirings
 Any additional scope not specified in this proposal

Quote No. 00523834 R1	Millington WWTP MD Denitrification Filters	August 26, 2022
-----------------------	---	-----------------

Equipment Budget Pricing:

Scenario 1: (3) CBF 929-30 filter modules arranged in (3) concrete cells of (1) module each as defined above..... \$ 557,520.00 US Dollars

Adder for Denitrification Control Package Inclusive of:

1. Instrumentation (In line nutrient analyzer, sensors, and auto valves, etc.)
2. PLC Control Panel for whole Denitrification Filter process
..... **\$ 250,000 US Dollars**

FCA: Freight is included to site.

Taxes and Duties are Not Included

Shipment, offloading, placement, and storage of the Evoqua Water Technologies supplied equipment shall be the responsibility of the customer. All interconnecting piping and wiring shall be the responsibility of the customer. Pricing good for 45 days.

We trust that the information is of interest. Should there be any questions with this proposal or with the technology, please feel free to give me a call.

Sincerely



Miguel Gutierrez
Technical Sales Engineer
Evoqua Water Technologies
(229) 516 5286
miguel.gutierrez@evoqua.com

EVOQUA WATER TECHNOLOGIES LLC**Standard Terms of Sale**

1. Applicable Terms. These terms govern the purchase and sale of equipment, products, related services, leased products, and media goods if any (collectively herein "Work"), referred to in Seller's proposal ("Seller's Documentation"). Whether these terms are included in an offer or an acceptance by Seller, such offer or acceptance is expressly conditioned on Buyer's assent to these terms. Seller rejects all additional or different terms in any of Buyer's forms or documents.

2. Payment. Buyer shall pay Seller the full purchase price as set forth in Seller's Documentation. Unless Seller's Documentation specifically provides otherwise, freight, storage, insurance and all taxes, levies, duties, tariffs, permits or license fees or other governmental charges relating to the Work or any incremental increases thereto shall be paid by Buyer. If Seller is required to pay any such charges, Buyer shall immediately reimburse Seller. If Buyer claims a tax or other exemption or direct payment permit, it shall provide Seller with a valid exemption certificate or permit and indemnify, defend and hold Seller harmless from any taxes, costs and penalties arising out of same. All payments are due within 30 days after receipt of invoice. Buyer shall be charged the lower of 1 ½% interest per month or the maximum legal rate on all amounts not received by the due date and shall pay all of Seller's reasonable costs (including attorneys' fees) of collecting amounts due but unpaid. All orders are subject to credit approval by Seller. Back charges without Seller's prior written approval shall not be accepted.

3. Delivery. Delivery of the Work shall be in material compliance with the schedule in Seller's Documentation. Unless Seller's Documentation provides otherwise, delivery terms are ExWorks Seller's factory (Incoterms 2010). Title to all Work shall pass upon receipt of payment for the Work under the respective invoice. Unless otherwise agreed to in writing by Seller, shipping dates are approximate only and Seller shall not be liable for any loss or expense (consequential or otherwise) incurred by Buyer or Buyer's customer if Seller fails to meet the specified delivery schedule.

4. Ownership of Materials and Licenses. All devices, designs (including drawings, plans and specifications), estimates, prices, notes, electronic data, software and other documents or information prepared or disclosed by Seller, and all related intellectual property rights, shall remain Seller's property. Seller grants Buyer a non-exclusive, non-transferable license to use any such material solely for Buyer's use of the Work. Buyer shall not disclose any such material to third parties without Seller's prior written consent. Buyer grants Seller a non-exclusive, non-transferable license to use Buyer's name and logo for marketing purposes, including but not limited to, press releases, marketing and promotional materials, and web site content.

5. Changes. Neither party shall implement any changes in the scope of Work described in Seller's Documentation without a mutually agreed upon change order. Any change to the scope of the Work, delivery schedule for the Work, any Force Majeure Event, any law, rule, regulation, order, code, standard or requirement which requires any change hereunder shall entitle Seller to an equitable adjustment in the price and time of performance.

6. Force Majeure Event. Neither Buyer nor Seller shall have any liability for any breach or delay (except for breach of payment obligations) caused by a Force Majeure Event. If a Force Majeure Event exceeds six (6) months in duration, the Seller shall have the right to terminate the Agreement without liability, upon fifteen (15) days written notice to Buyer, and shall be entitled to payment for work performed prior to the date of termination. "Force Majeure Event" shall mean events or circumstances that are beyond the affected party's control and could not reasonably have been easily avoided or overcome by the affected party and are not substantially attributable to the other party. Force Majeure Event may include, but is not limited to, the following circumstances or events: war, act of foreign enemies, terrorism, riot, strike, or lockout by persons other than by Seller or its sub-suppliers, natural catastrophes or (with respect to on-site work), unusual weather conditions.

7. Warranty. Subject to the following sentence, Seller warrants to Buyer that the (i) Work shall materially conform to the description in Seller's Documentation and shall be free from defects in material and workmanship and (ii) the Services shall be performed in a timely and workmanlike manner. Determination of suitability of treated water for any use by Buyer shall be the sole and exclusive responsibility of Buyer. The foregoing warranty shall not apply to any Work that is specified or otherwise demanded by Buyer and is not manufactured or selected by Seller, as to which (i) Seller hereby assigns to Buyer, to the extent assignable, any warranties made to Seller and (ii) Seller shall have no other

liability to Buyer under warranty, tort or any other legal theory. The Seller warrants the Work, or any components thereof, through the earlier of (i) eighteen (18) months from delivery of the Work or (ii) twenty-four (24) months from initial operation of the Work or ninety (90) days from the performance of services (the "Warranty Period"). If Buyer gives Seller prompt written notice of breach of this warranty within the Warranty Period, Seller shall, at its sole option and as Buyer's sole and exclusive remedy, repair or replace the subject parts, re-perform the Service or refund the purchase price. Unless otherwise agreed to in writing by Seller, (i) Buyer shall be responsible for any labor required to gain access to the Work so that Seller can assess the available remedies and (ii) Buyer shall be responsible for all costs of installation of repaired or replaced Work. If Seller determines that any claimed breach is not, in fact, covered by this warranty, Buyer shall pay Seller its then customary charges for any repair or replacement made by Seller. Seller's warranty is conditioned on Buyer's (a) operating and maintaining the Work in accordance with Seller's instructions, (b) not making any unauthorized repairs or alterations, and (c) not being in default of any payment obligation to Seller. Seller's warranty does not cover (i) damage caused by chemical action or abrasive material, misuse or improper installation (unless installed by Seller) and (ii) media goods (such as, but not limited to, resin, membranes, or granular activated carbon media) once media goods are installed. THE WARRANTIES SET FORTH IN THIS SECTION 7 ARE THE SELLER'S SOLE AND EXCLUSIVE WARRANTIES AND ARE SUBJECT TO THE LIMITATION OF LIABILITY PROVISION BELOW. SELLER MAKES NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE.

8. Indemnity. Seller shall indemnify, defend and hold Buyer harmless from any claim, cause of action or liability incurred by Buyer as a result of third party claims for personal injury, death or damage to tangible property, to the extent caused by Seller's negligence. Seller shall have the sole authority to direct the defense of and settle any indemnified claim. Seller's indemnification is conditioned on Buyer (a) promptly, within the Warranty Period, notifying Seller of any claim, and (b) providing reasonable cooperation in the defense of any claim.

9. Assignment. Neither party may assign this Agreement, in whole or in part, nor any rights or obligations hereunder without the prior written consent of the other party; provided, however, the Seller may assign its rights and obligations under these terms to its affiliates or in connection with the sale or transfer of the Seller's business and Seller may grant a security interest in the Agreement and/or assign proceeds of the agreement without Buyer's consent.

10. Termination. Either party may terminate this agreement, upon issuance of a written notice of breach and a thirty (30) day cure period, for a material breach (including but not limited to, filing of bankruptcy, or failure to fulfill the material obligations of this agreement). If Buyer suspends an order without a change order for ninety (90) or more days, Seller may thereafter terminate this Agreement without liability, upon fifteen (15) days written notice to Buyer, and shall be entitled to payment for work performed, whether delivered or undelivered, prior to the date of termination.

11. Dispute Resolution. Seller and Buyer shall negotiate in good faith to resolve any dispute relating hereto. If, despite good faith efforts, the parties are unable to resolve a dispute or claim arising out of or relating to this Agreement or its breach, termination, enforcement, interpretation or validity, the parties will first seek to agree on a forum for mediation to be held in a mutually agreeable site. If the parties are unable to resolve the dispute through mediation, then any dispute, claim or controversy arising out of or relating to this Agreement or the breach, termination, enforcement, interpretation or validity thereof, including the determination of the scope or applicability of this agreement to arbitrate, shall be determined by arbitration in Pittsburgh, Pennsylvania before three arbitrators who are lawyers experienced in the discipline that is the subject of the dispute and shall be jointly selected by Seller and Buyer. The arbitration shall be administered by JAMS pursuant to its Comprehensive Arbitration Rules and Procedures. The Arbitrators shall issue a reasoned decision of a majority of the arbitrators, which shall be the decision of the panel. Judgment may be entered upon the arbitrators' decision in any court of competent jurisdiction. The substantially prevailing party as determined by the arbitrators shall be reimbursed by the other party for all costs, expenses and charges, including without limitation reasonable attorneys' fees, incurred by the prevailing party in connection with the arbitration. For any order shipped outside of the United States, any dispute shall be referred to and finally determined by the International Center for Dispute Resolution in accordance with the provisions of its International Arbitration Rules, enforceable under the New York Convention (Convention on the Recognition and Enforcement of Foreign Arbitral Awards) and the governing language shall be English.

12. Export Compliance. Buyer acknowledges that Seller is required to comply with applicable export laws and regulations relating to the sale, exportation, transfer, assignment, disposal and usage of the Work provided under this Agreement, including any export license requirements. Buyer agrees that such Work shall not at any time directly or indirectly be used, exported, sold, transferred, assigned or otherwise disposed of in a manner which will result in non-

Quote No. 00523834 R1	Millington WWTP MD Denitrification Filters	August 26, 2022
-----------------------	---	-----------------

compliance with such applicable export laws and regulations. It shall be a condition of the continuing performance by Seller of its obligations hereunder that compliance with such export laws and regulations be maintained at all times. BUYER AGREES TO INDEMNIFY AND HOLD SELLER HARMLESS FROM ANY AND ALL COSTS, LIABILITIES, PENALTIES, SANCTIONS AND FINES RELATED TO NON-COMPLIANCE WITH APPLICABLE EXPORT LAWS AND REGULATIONS.

13. LIMITATION OF LIABILITY. NOTWITHSTANDING ANYTHING ELSE TO THE CONTRARY, SELLER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL, PUNITIVE OR OTHER INDIRECT DAMAGES, AND SELLER'S TOTAL LIABILITY ARISING AT ANY TIME FROM THE SALE OR USE OF THE WORK, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR ALL WARRANTY CLAIMS OR FOR ANY BREACH OR FAILURE TO PERFORM ANY OBLIGATION UNDER THE CONTRACT, SHALL NOT EXCEED THE PURCHASE PRICE PAID FOR THE WORK. THESE LIMITATIONS APPLY WHETHER THE LIABILITY IS BASED ON CONTRACT, TORT, STRICT LIABILITY OR ANY OTHER THEORY.

14. Rental Equipment / Services. Any leased or rented equipment ("Leased Equipment") provided by Seller shall at all times be the property of Seller with the exception of certain miscellaneous installation materials purchased by the Buyer, and no right or property interest is transferred to the Buyer, except the right to use any such Leased Equipment as provided herein. Buyer agrees that it shall not pledge, lend, or create a security interest in, part with possession of, or relocate the Leased Equipment. Buyer shall be responsible to maintain the Leased Equipment in good and efficient working order. At the end of the initial term specified in the order, the terms shall automatically renew for the identical period unless canceled in writing by Buyer or Seller not sooner than three (3) months nor later than one (1) month from termination of the initial order or any renewal terms. Upon any renewal, Seller shall have the right to issue notice of increased pricing which shall be effective for any renewed terms unless Buyer objects in writing within fifteen (15) days of issuance of said notice. If Buyer timely cancels service in writing prior to the end of the initial or any renewal term this shall not relieve Buyer of its obligations under the order for the monthly rental service charge which shall continue to be due and owing. Upon the expiration or termination of this Agreement, Buyer shall promptly make any Leased Equipment available to Seller for removal. Buyer hereby agrees that it shall grant Seller access to the Leased Equipment location and shall permit Seller to take possession of and remove the Leased Equipment without resort to legal process and hereby releases Seller from any claim or right of action for trespass or damages caused by reason of such entry and removal.

15. Miscellaneous. These terms, together with any Contract Documents issued or signed by the Seller, comprise the complete and exclusive statement of the agreement between the parties (the "Agreement") and supersede any terms contained in Buyer's documents, unless separately signed by Seller. No part of the Agreement may be changed or cancelled except by a written document signed by Seller and Buyer. No course of dealing or performance, usage of trade or failure to enforce any term shall be used to modify the Agreement. To the extent the Agreement is considered a subcontract under Buyer's prime contract with an agency of the United States government, in case of Federal Acquisition Regulations (FARs) flow down terms, Seller will be in compliance with Section 44.403 of the FAR relating to commercial items and those additional clauses as specifically listed in 52.244-6, Subcontracts for Commercial Items (OCT 2014). If any of these terms is unenforceable, such term shall be limited only to the extent necessary to make it enforceable, and all other terms shall remain in full force and effect. The Agreement shall be governed by the laws of the Commonwealth of Pennsylvania without regard to its conflict of laws provisions. Both Buyer and Seller reject the applicability of the United Nations Convention on Contracts for the international sales of goods to the relationship between the parties and to all transactions arising from said relationship.

5/1/2015

TROJANUV3000™PTP

Wastewater Disinfection

TROJAN ™

 Water
Confidence™

TROJAN UV3000™ PTP

Robust, operator-friendly solutions designed for economical disinfection

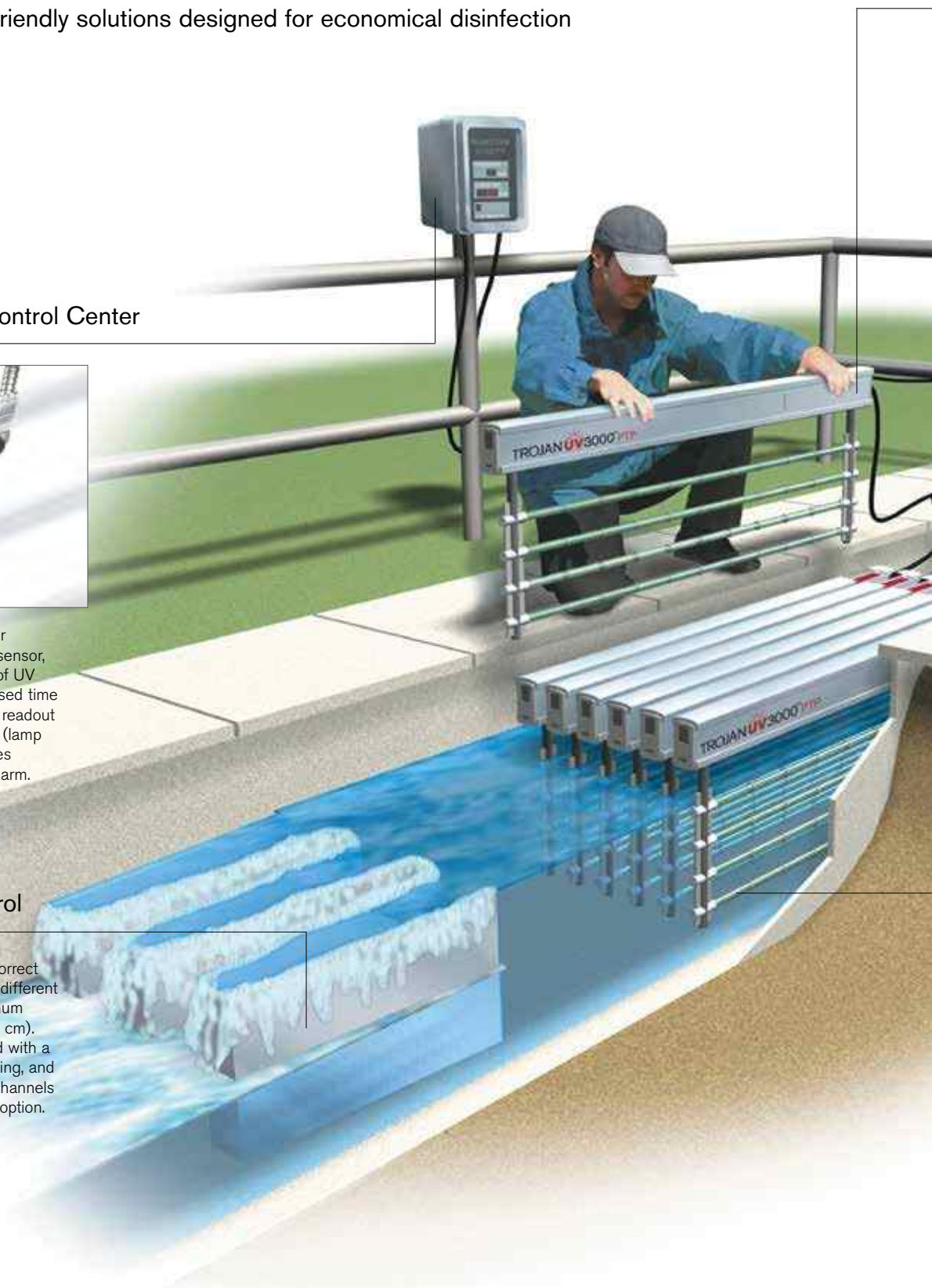
System Monitor/Control Center



The optional System Monitor includes a submersible UV sensor, and provides digital output of UV intensity at each bank. Elapsed time display provides continuous readout of actual hours of operation (lamp hours). A dry contact enables a remote low UV intensity alarm.

Water Level Control

A fixed weir maintains the correct channel effluent depth over different flow rates, allowing a maximum head loss of 1.5 inches (3.8 cm). The system is also equipped with a drain for easy channel cleaning, and available for both concrete channels and stainless steel channel option.



Electronic Ballast



The electronic ballast is mounted within its own Type 6P (IP67)-rated watertight enclosure within the module frame and is cooled by convection.

Power Distribution



Each Power Distribution Receptacle (PDR) powers two (2) UV modules and allows for quick and safe electrical disconnect. The duplex ground fault interrupter receptacles ensure operator safety and are mounted inside Type 3R rain shield boxes.

UV Modules

UV lamps are mounted on stainless steel frames. Lamps are enclosed in quartz sleeves and submerged horizontally and parallel to water flow. A bank is made up of multiple modules placed in parallel positions. All wiring, from ballasts to lamps, runs inside the module frame. A display showing individual lamp status is provided on top of each module.

Stainless Steel Effluent Channel



An optional Type 304 stainless steel channel, complete with UV module support rack, can be used. Channel can be installed as a freestanding structure connected to flanged pipes using the optional transition boxes.

Simple, Dependable UV Solutions

Proven, chemical-free disinfection from the industry leader

TROJAN **UV**3000™PTP

UV is the most effective, safe and environmentally friendly way to disinfect wastewater. It provides broad-spectrum protection against a wide range of pathogens, including bacteria, viruses and chlorine-resistant protozoa (such as Cryptosporidium and Giardia).

The TrojanUV3000™PTP (Packaged Treatment Plant) is a simple, robust and operator-friendly UV systems used for the disinfection of wastewater. This highly flexible system has demonstrated effective and reliable performance around the world. The TrojanUV3000PTP is pre-engineered for quick, inexpensive installation with pipe runs using pre-fabricated, flanged stainless steel channels, or into existing chlorine contact basins and effluent channels.

The proven infrastructure of the TrojanUV3000PTP has been continuously refined to enhance friendly operation.



Key Benefits

TrojanUV3000PTP

Increased operator, community and environmental safety. Uses environmentally friendly ultraviolet light – the safest alternative for wastewater disinfection. No disinfection by-products are created and no chlorine compounds are transported, stored or handled by plant staff.

Proven disinfection. Based on actual dose delivery testing (bioassay validation). Verified field performance data eliminates sizing assumptions resulting from theoretical dose calculations.

Reduced engineering and installation costs. The TrojanUV3000PTP can be equipped with pre-fabricated stainless steel channels and transition boxes for inline integration with existing flanged piping – thus minimizing engineering and installation costs. The system can be easily retrofitted into existing chlorine contact tanks and effluent channels, and comes pre-tested, pre-assembled and pre-wired to minimize installation costs.

Designed for simplicity and reliability. Systems are straightforward to operate and require minimal operator involvement, thanks to modular design and robust components.

Operator-friendly maintenance. Our lamps are guaranteed for 12,000 hours of operation and can be replaced without tools in less than three minutes per lamp. Modules are electrically separate, allowing a single module to be removed without disrupting flow or taking the system offline.

Outdoor installation flexibility. All components can be installed outdoors, eliminating the need and costs of a building, shelter and air conditioning for ballast cooling.

Well suited to changing regulations. Our systems do not have any negative impact on receiving waters, making them strategically sound choice for long-term treatment as regulations continue to become increasingly stringent.

Guaranteed performance and comprehensive warranty. Our systems include a Lifetime Disinfection Performance Guarantee.

Advanced, Self-Contained UV Modules

Compact footprint simplifies installation and eliminates air conditioning costs

Benefits:

- Space-saving, electronic ballasts are housed in the modules to minimize footprint size, installation time and costs
- Convection cooling of the ballasts eliminates costs associated with air conditioning or forced-air cooling
- Lamps are protected in a fully-submersible, Type 316 stainless steel frame
- All wiring and cables are safely enclosed inside the waterproof module frame – fully protecting them from effluent and UV light
- Modules are electrically separated from each other, allowing them to be individually removed for maintenance and spare modules quickly inserted to maintain maximum performance



The advanced, self-contained modules incorporate convection-cooled ballasts and feature a UV lamp status indicator (below) for at-a-glance confirmation that all lamps are operating.

- Streamlined modules minimize head loss and prevent buildup of debris on the lamps
- All module wiring is pre-installed and factory-tested



Innovative Ballasts and Enclosures Provide Significant Advantages

Module-mounted Ballasts	• Take up less space and reduce footprint, minimizing installation time and costs
Convection Cooling	• Housing the ballasts in the module allows for natural convection cooling to dissipate the heat of the ballasts into the air • The ballasts are kept sealed and protected • No air conditioning or forced-air cooling required
Clean, Water-tight Protection	• Some suppliers use external cabinets with forced-air cooling. This introduces dust and moisture onto circuit boards and other electronic components, greatly reducing the life of these components • Internal housing in sealed modules keeps all components dry and clean
Internal Cabling	• All lamp/ballast wiring is contained within the module frame. This configuration protects wires and cables from exposure to effluent, debris fouling and UV light • Internal cabling allows all electrical connections within the module to be factory-tested

Proven Performance, Components and Design

Validated through regulatory-endorsed bioassay testing

Benefits:

- Performance data is generated from actual field testing (bioassay validation) over a range of flow rates, effluent qualities and UV transmittances
- Provides regulatory-endorsed physical verification that systems will perform as expected – ensuring public and environmental safety
- Most accurate assessment of system sizing needs
- Low-pressure lamps and ballasts have proven their outstanding reliability in thousands of installations
- Open-channel design allows cost-effective installation into existing effluent channels & chlorine contact basins
- Systems can be installed outdoors to reduce building capital costs
- Modular design is scalable for precise sizing, and expandable to meet new regulatory or capacity requirements



Gravity-fed, open channel design delivers cost savings at installation through simple retrofits into existing effluent channels and chlorine contact tanks. Rugged, proven components make operation and maintenance extremely cost effective.

Designed & Built for Easy Maintenance

User-friendly design requires minimal service and operator involvement

Benefits:

- Lamps are warranted for 12,000 hours
- Routine maintenance can be scheduled and completed without disrupting disinfection
- Replacement of UV lamps can be completed without tools and requires less than three minutes per lamp



Lightweight, self-contained modules are operator-friendly and make routine maintenance quick and easy. Modules can be individually removed for periodic sleeve cleaning and lamp replacement after 12,000 hours. An optional, mobile cleaning rack simplifies maintenance procedures.

Highly Flexible Installation Configurations

Pre-engineered for cost-effective integration with piping or channels

Benefits:

- Designed to meet disinfection requirements with minimal engineering costs
- Can be installed in series to treat higher flows or provide additional redundancy
- Pre-engineered stainless steel channels with built-in weirs are installed as a freestanding structure
- Stainless steel channels are easily integrated with existing flanged piping using our highly flexible transition boxes (Figure 1)
- Optional turn boxes minimize system footprint by connecting stainless steel channels and allowing two banks in series to be installed side-by-side (Figure 2)
- Transition boxes can be designed for straight, left or right pipe connections (Figure 3)



Figure 1: Banks in Series – Side View

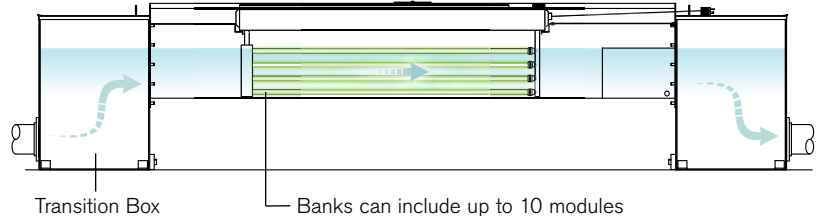


Figure 2: Banks in Series With Turn Box – Overhead View

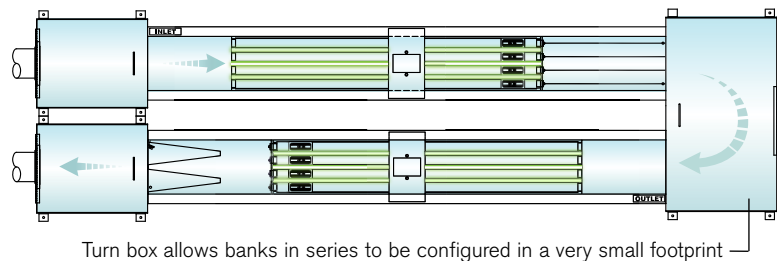
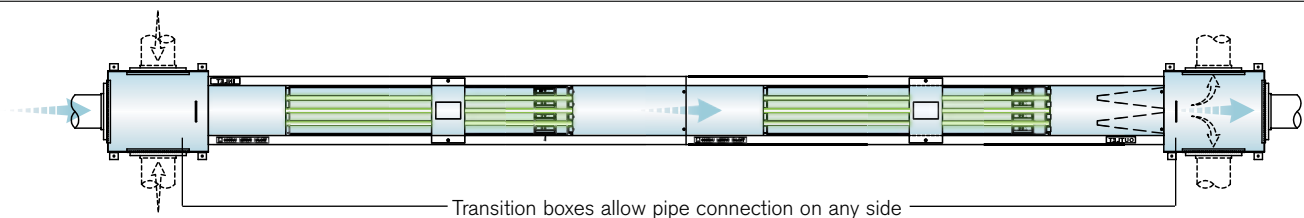


Figure 3: Banks in Series – Overhead View



Pre-engineered for simple, effective, low-cost wastewater disinfection. The optional 304 stainless steel channels feature a UV module support rack, and can be installed as a freestanding unit. Turn boxes and transition boxes allow systems to be incorporated with maximum flexibility and minimal footprint.

System Specifications

System Characteristics	TrojanUV3000™PTP
Typical Applications	Up to 3 MGD (473 m³/hr)
Lamp Type	Low-pressure
Ballast Type	Electronic; non-variable
Input Power Per Lamp	45 or 87.5 Watts
Lamp Configuration	Horizontal, parallel to flow
Module Configuration	2 or 4 lamps per module
Bank Configuration	Up to 10 modules per bank
Channel Configurations	
Lamp Banks in Series	Up to 2
Channel Options	Stainless Steel (Trojan option) or Concrete (by others)
Flanged Transition Connections	Optional for stainless steel channels
U-Turn Connector Box	Optional for stainless steel channels
Level Control Device Options	Fixed weir
Enclosure Ratings	
System Monitor/Control Center	Fibreglass
Ballast Enclosure	TYPE 6P (IP67)
Ballast Cooling Method	Convection; no air conditioning or forced air required
Installation Location	Indoor or outdoor
System Monitoring & Controls	
Controller	Optional; Monitoring only
UV Intensity Monitoring	Optional
Flow Pacing	—
Inputs Required	None
Local Status Indication	Lamp Age (hours) UV Intensity (mW/cm²)
Remote Alarms	UV Intensity (4-20 mA)
Location	Indoor or outdoor
Maximum Distance from UV Channel	15 ft. (4.5 m)
Electrical Requirements	
Power Distribution	Individual GFI Receptacles
Quantity Required	1 receptacle per 2 modules
Power Input	120V, single phase

TrojanUV is part of the Trojan Technologies group of businesses.

Head Office (Canada)

3020 Gore Road, London, Ontario, Canada N5V 4T7
Telephone: (519) 457-3400 Fax: (519) 457-3030

www.trojanuv.com

Trojan Technologies Deutschland GmbH

Aschaffener Str. 72, 63825 Schöllkrippen, Germany
Telephone: +49 6024 634 758 0 Fax: +49 6024 634 758 8

For a list of our global offices, please visit trojanuv.com/contactus.

The products described in this publication may be protected by one or more patents in The United States of America, Canada and/or other countries. For a list of patents owned by Trojan Technologies, go to www.trojantechnologies.com.

Copyright 2018. TrojanUV - A Division of Trojan Technologies Group ULC. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means without the written permission of Trojan Technologies. (0218)

A photograph of a Trojan UV3000 disinfection system, showing multiple parallel UV lamps housed in a metal frame. The system is connected to a control unit with several cables. The image is overlaid with a red semi-transparent geometric shape.

TROJANUV3000™B

Wastewater Disinfection

TROJAN ™

 Water
Confidence™

TROJAN UV3000™ B

Robust, operator-friendly solutions designed for economical disinfection

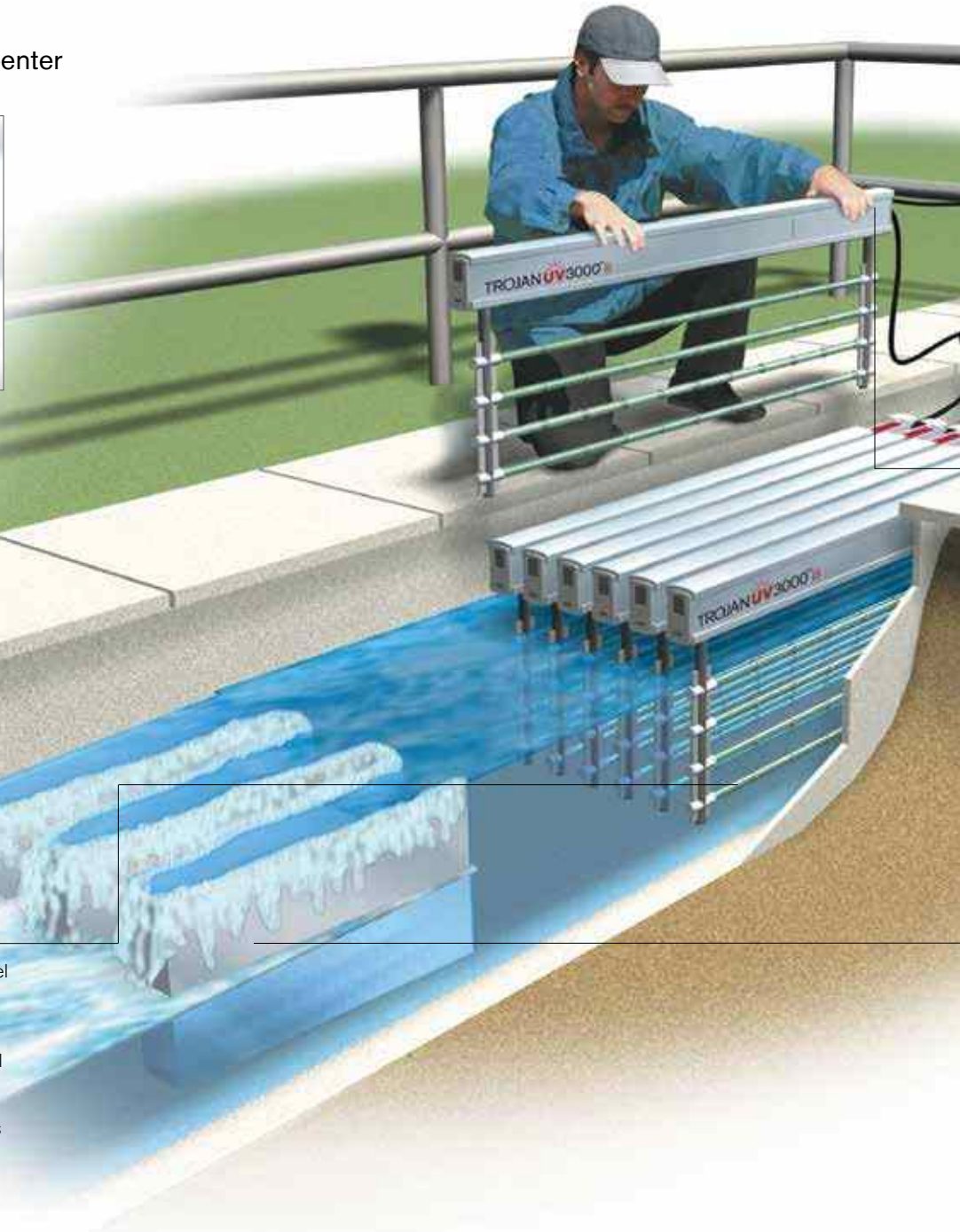
System Monitor/Control Center



The System Control Center takes a signal from a submersible UV sensor, and provides digital output of UV intensity from each bank. Elapsed time display provides continuous readout of actual hours of operation (lamp hours).

UV Modules

UV lamps are mounted on stainless steel frames. Lamps are enclosed in quartz sleeves and submerged horizontally and parallel to water flow. A bank is made up of multiple modules placed in parallel positions. All wiring, from ballasts to lamps, runs inside the module frame. A display showing individual lamp status is provided on top of each module.



Power Distribution

The Power Distribution Center (PDC) is constructed of stainless steel and is mounted across the channel. The PDC distributes power to individual modules and allows electrical isolation of each module for easy service.



Electronic Ballast



The electronic ballast is mounted within its own Type 6P (IP67)-rated watertight enclosure within the module frame and is cooled by convection.

Water Level Control



Available with a fixed weir or Automatic Level Control (ALC) gate in the channel to maintain the appropriate water level over the lamps. Engineers will work with you to select the appropriate level control device for your application.



The System Control Center (SCC) provides control of all UV functions, tracks lamp hours, and uses a submersible UV sensor (one per bank) to monitor UV intensity. The SCC is capable of flow pacing – automatically turning banks of UV lamps off or on in response to changes in the flow rate in order to conserve power and prolong lamp life.



The optional Touch Smart controller provides more sophisticated controls over the basic controller adding the ability to control up to two channels with three banks in each, SCADA communications, data logging, redundant bank logic and remote on/off signal in addition to the standard basic controller features.

Simple, Dependable UV Solutions

Proven, chemical-free disinfection from the industry leader

TROJAN **UV3000™**B

UV is the most effective, safe and environmentally friendly way to disinfect wastewater. It provides broad-spectrum protection against a wide range of pathogens, including bacteria, viruses and chlorine-resistant protozoa (such as *Cryptosporidium* and *Giardia*).

The TrojanUV3000™B is an example of a simple, robust and operator-friendly UV system used for the disinfection of wastewater. This highly flexible system has demonstrated effective and reliable performance around the world. The TrojanUV3000B offers increased capacity and is available with a controller that enables flow pacing to maximize operating efficiency and extend lamp life. The system turns UV lamp banks on and off automatically to ensure the required dose is met using the fewest lamps and least electricity.

The proven infrastructure of the TrojanUV3000B has been continuously refined to enhance friendly operation.



Key Benefits

TrojanUV3000B

Increased operator, community and environmental safety. Uses environmentally friendly ultraviolet light – the safest alternative for wastewater disinfection. No disinfection by-products are created and no chlorine compounds are transported, stored or handled by plant staff.

Proven disinfection. Based on actual dose delivery testing (bioassay validation). Verified field performance data eliminates sizing assumptions resulting from theoretical dose calculations.

Reduced engineering and installation costs. The system can be easily retrofitted into existing chlorine contact tanks and effluent channels, and comes pre-tested, pre-assembled and pre-wired to minimize installation costs.

Designed for simplicity and reliability. Systems are straightforward to operate and require minimal operator involvement, thanks to modular design and robust components.

Operator-friendly maintenance. Our lamps are guaranteed for 12,000 hours of operation and can be replaced without tools in less than three minutes per lamp. Modules are electrically separate, allowing a single module to be removed without disrupting flow or taking the system offline.

Outdoor installation flexibility. All components can be installed outdoors, eliminating the need and costs of a building, shelter and air conditioning for ballast cooling.

Well suited to changing regulations. Our systems do not have any negative impact on receiving waters, making them strategically sound choice for long-term treatment as regulations continue to become increasingly stringent.

Guaranteed performance and comprehensive warranty. Our systems include a Lifetime Disinfection Performance Guarantee.

Advanced, Self-Contained UV Modules

Compact footprint simplifies installation and eliminates air conditioning costs

Benefits:

- Space-saving, electronic ballasts are housed in the modules to minimize footprint size, installation time and costs
- Convection cooling of the ballasts eliminates costs associated with air conditioning or forced-air cooling
- Lamps are protected in a fully-submersible, Type 316 stainless steel frame
- All wiring and cables are safely enclosed inside the waterproof module frame – fully protecting them from effluent and UV light
- Modules are electrically separated from each other, allowing them to be individually removed for maintenance and spare modules quickly inserted to maintain maximum performance



The advanced, self-contained modules incorporate convection-cooled ballasts and feature a UV lamp status indicator (below) for at-a-glance confirmation that all lamps are operating.

- Streamlined modules minimize head loss and prevent buildup of debris on the lamps
- All module wiring is pre-installed and factory-tested



Innovative Ballasts and Enclosures Provide Significant Advantages

Module-mounted Ballasts	▪ Take up less space and reduce footprint, minimizing installation time and costs
Convection Cooling	▪ Housing the ballasts in the module allows for natural convection cooling to dissipate the heat of the ballasts into the air ▪ The ballasts are kept sealed and protected ▪ No air conditioning or forced-air cooling required
Clean, Water-tight Protection	▪ Some suppliers use external cabinets with forced-air cooling. This introduces dust and moisture onto circuit boards and other electronic components, greatly reducing the life of these components ▪ Internal housing in sealed modules keeps all components dry and clean
Internal Cabling	▪ All lamp/ballast wiring is contained within the module frame. This configuration protects wires and cables from exposure to effluent, debris fouling and UV light ▪ Internal cabling allows all electrical connections within the module to be factory-tested

Proven Performance, Components and Design

Validated through regulatory-endorsed bioassay testing

Benefits:

- Performance data is generated from actual field testing (bioassay validation) over a range of flow rates, effluent qualities and UV transmittances
- Provides regulatory-endorsed physical verification that systems will perform as expected – ensuring public and environmental safety
- Most accurate assessment of system sizing needs
- Low-pressure lamps and ballasts have proven their outstanding reliability in thousands of installations
- Open-channel design allows cost-effective installation into existing effluent channels & chlorine contact basins
- Systems can be installed outdoors to reduce building capital costs
- Modular design is scalable for precise sizing, and expandable to meet new regulatory or capacity requirements



Gravity-fed, open channel design delivers cost savings at installation through simple retrofits into existing effluent channels and chlorine contact tanks. Rugged, proven components make operation and maintenance extremely cost effective.

Designed & Built for Easy Maintenance

User-friendly design requires minimal service and operator involvement

Benefits:

- Lamps are warranted for 12,000 hours
- Routine maintenance can be scheduled and completed without disrupting disinfection
- Replacement of UV lamps can be completed without tools and requires less than three minutes per lamp



Lightweight, self-contained modules are operator-friendly and make routine maintenance quick and easy. Modules can be individually removed for periodic sleeve cleaning and lamp replacement after 12,000 hours. An optional, mobile cleaning rack simplifies maintenance procedures.

Flow Pacing Reduces O&M Costs

TrojanUV3000B system controller offers flow-pacing for increased operating efficiency

Benefits:

- The System Control Center (SCC) provides monitoring and control of all UV functions
- The SCC provides digital display of bank status, lamp hours, and UV intensity (mW/cm^2)
- The SCC allows the system to be flow paced – meaning the UV lamps of individual banks are turned on and off automatically in response to variations in flow rate (based on a flow meter signal)
- Flow pacing maximizes operating efficiency by matching UV output to disinfection requirements, and reducing electrical consumption during periods of low flow by turning lamps off (Figures 1 & 2)
- Flow pacing also increases the operating life of UV lamps, thereby reducing the frequency, expense and labor required for lamp replacement



The optional Touch Smart controller provides more sophisticated controls over the basic controller adding the ability to control up to 2 channels with 3 banks in each, SCADA communications, data logging, redundant bank logic and remote on/off signal in addition to the standard basic controller features.

Flow Pacing Optimizes System Efficiency

Figure 1: Operation During Periods of High Flow

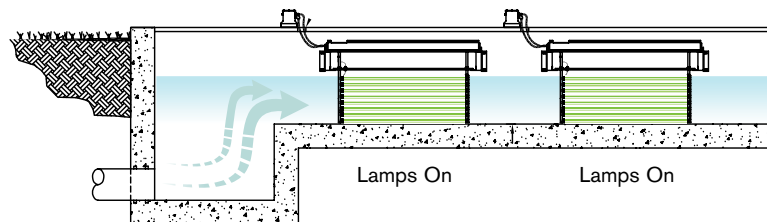
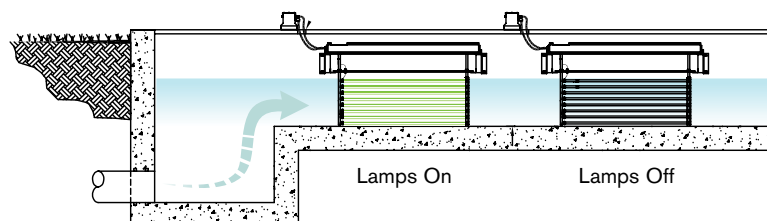


Figure 2: Operation During Periods of Low Flow



System Specifications	
System Characteristics	TrojanUV3000™B
Typical Applications	1 – 5 MGD (158 – 789 m³/hr)
Lamp Type	Low-pressure
Ballast Type	Electronic; non-variable
Input Power Per Lamp	87.5 Watts
Lamp Configuration	Horizontal, parallel to flow
Module Configuration	4, 6 or 8 lamps per module
Bank Configuration	Up to 20 modules per bank
Channel Configurations	
Lamp Banks in Series	Up to 3
Channel Options	Concrete (by others)
Level Control Device Options	ALC gate or fixed weir
Enclosure Ratings	
System Monitor/Control Center	304 stainless steel
Ballast Enclosure	Type 6P (IP67)
Ballast Cooling Method	Convection; no air conditioning or forced air required
Installation Location	Indoor or outdoor
System Monitoring & Controls	
Controller	Monitoring and bank control
UV Intensity Monitoring	Optional
Flow Pacing	Optional
Inputs Required	4-20 mA flow signal for Flow Pacing
Local Status Indication	Lamp Age (hours) UV Intensity (mW/cm²) Bank Status (on/off) Low Intensity Alarm
Remote Alarms	UV Intensity (4-20 mA) Common Alarm (discrete)
Location	Indoor or outdoor
Maximum Distance from UV Channel	20 ft. (6 m)
Electrical Requirements	
Power Distribution	Power Distribution Centre
Quantity Required	1 PDC per bank
Power Input	120V; single phase 208V, 3-phase 240V; single phase

TrojanUV3000™B Controller Capabilities		
Size Constraints		
	Basic Controller	Touch Smart Controller
Max # of Channels	1	2
Slide Gate Control	No	Monitor Only
Max Modules/Bank	20	20
Max Banks/Channel	3	3
Control/Alarm Constraints		
Screen Interface	7 Segment Numeric Display	7" Color Touch Screen
Flow Pacing	Yes	Yes
Dose Pacing	No	No
Individual Lamp Status	No	No
Lead Bank Rotation	Automatic	Automatic or Manual
Redundant Bank Logic	No	Yes *
Multiple Lamp Failure	No	No
Adjacent Lamp Failure	No	No
Module Failure Alarm	No	No
Bank Comm. Fail Alarm	No	No
Low Water Level ***	No	Yes
High Water Level ***	No	Yes
Remote System On/Off	No	DI
Remote Bank On/Off	No	-
Add additional bank	No	DI
USB Data Logging	No	Yes
Remote Monitoring Constraints		
SCADA	No	Yes **
Bank Status	Yes	Yes
Common Alarm	Yes	Major, Minor
Low UV Intensity Alarm	No	Yes
Bank UV Intensity Alarm	No	SCADA
Average UVI Analog Out	No	Yes
Input/Output Constraints		
Discrete Inputs	0	8
Discrete Outputs	4	8
Analog Inputs	Flow	Flow and UVT ***
Analog Outputs	0	2 (One (1) per Bank)

*Note – redundant bank logic is driven by a single lamp failure OR low UVI alarm in a bank as there is no way to distinguish between one or many lamps failed

**Note – Modbus Ethernet SCADA is standard, Modbus RTU is option, as an add-on. Other protocols are possible as a custom solution. All remote monitoring signals are available on SCADA. Remote capabilities - no control available over SCADA.

***Note – level alarms require optional level sensor probe, UVT measurement requires optional UVT meter

TrojanUV is part of the Trojan Technologies group of businesses.

Head Office (Canada)

3020 Gore Road, London, Ontario, Canada N5V 4T7
Telephone: (519) 457-3400 Fax: (519) 457-3030

www.trojanuv.com

Trojan Technologies Deutschland GmbH

Aschaffener Str. 72, 63825 Schöllkrippen, Germany
Telephone: +49 6024 634 758 0 Fax: +49 6024 634 758 8

For a list of our global offices, please visit trojanuv.com/contactus.

The products described in this publication may be protected by one or more patents in The United States of America, Canada and/or other countries. For a list of patents owned by Trojan Technologies, go to www.trojantechnologies.com.

Copyright 2018. TrojanUV - A Division of Trojan Technologies Group ULC. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means without the written permission of Trojan Technologies. (0218)

APPENDIX C:

COST ESTIMATES

**Kent County Regional WWTP - Preliminary Cost
Opinion Summary Kubota MBR**

Project No.: 132201169
Project Name: Kent County Regional WWTP
By: AMW
CK By: DRS

Item No.	Description	Quantity	Unit	Unit Cost, \$		Total
				Material	Labor	
New WWTP Standard Equipment						
1	Headworks Building	1100	SF	\$ 120	\$ 70	\$ 209,000
2	Fine Screen	1	EA	\$ 53,000	\$ 16,000	\$ 69,000
3	Concrete for Mechanical Screen	40	CY	\$ 500	\$ 400	\$ 35,683
4	Grit Removal System	1	EA	\$ 330,000	\$ 40,000	\$ 370,000
5	Influent Pumps, wetwell, control	1	LS	\$ 150,000	\$ 100,000	\$ 250,000
6	Equipment Buildings	4000	SF	\$ 40	\$ 45	\$ 340,000
7	UV Disinfection	1	EA	\$ 135,000	\$ 100,000	\$ 235,000
8	Concrete for UV Channel	40	CY	\$ 500	\$ 400	\$ 36,000
9	Belt Filter Press	1	EA	\$ 415,500	\$ 80,000	\$ 495,500
10	Site Piping	1	LS	\$ 200,000	\$ 300,000	\$ 500,000
11	Effluent Pump Station & Force Main	1	LS	\$ 200,000	\$ 125,000	\$ 325,000
12	Kubota MBR	1	LS	\$ 1,275,000	\$ 700,000	\$ 1,975,000
13	Aerobic Holding Tank Equipment	1	LS	\$ 314,835	\$ 100,000	\$ 414,835
14	Flow Equalization Equipment	1	LS	\$ 220,385	\$ 100,000	\$ 320,385
15	Concrete Tanks for Biological Process	400	CY	\$ 500	\$ 400	\$ 360,000
16	Concrete Tanks (EQ and Aerobic Holding)	640	CY	\$ 500	\$ 400	\$ 576,000
17	Concrete for Cascade Equipment	10	CY	\$ 500	\$ 400	\$ 9,000
18	Chemical Addition	1	LS	\$ 120,000	\$ 80,000	\$ 200,000
19	Process and Control Building	1	LS	\$ 600,000	\$ 350,000	\$ 950,000
				Subtotal		\$7,670,403
Conveyance System Improvements						
20	Demolition and Renovation of Existing WWTP	1	LS	\$ 75,000	\$ 225,000	\$ 300,000
21	Pumps, Controls, Renovations of Rob Vanary Park PS	1	LS	\$ 150,000	\$ 121,000	\$ 271,000
22	New Pump Station at Existing WWTP Site	1	LS	\$ 300,000	\$ 205,400	\$ 505,400
23	New Force Main (6" PVC)	6,800	LF	\$ 35	\$ 45	\$ 544,000
24	New Force Main (4" PVC)	100	LF	\$ 30	\$ 45	\$ 7,500
				Subtotal		\$1,627,900
General						
25	Construction Stake Out	0.5%			\$46,491.52	
26	E&S, SW management	1%			\$92,983.03	
27	Paving and Restoration	2%			\$185,966.07	
28	Electrical/HVAC/Mechanical (15%)	15%			\$1,394,745.50	
29	Bonds and Insurance (1%)	1%			\$92,983.03	
30	Mob and Demob (4%)	4%			\$371,932.13	
31	Contingency	25%			\$2,324,575.83	
				Total Construction	\$13,807,980	
				Subtotal	\$13,807,980	
32	Legal, Admin, Engineering, Design	10%			\$1,380,798.05	
33	Bidding, Construction Review, Inspection	5%			\$690,399.02	
				Total Project Cost		\$15,879,178

Project No.: 132201169
Project Name: Kent County Regional WWTP
By: AMW
CK By: DRS

**Kent County Regional WWTP - Preliminary Cost
Opinion Summary AQUA SBR**

Item No.	Description	Quantity	Unit	Unit Cost, \$		Total
				Material	Labor	
New WWTP Standard Equipment						
1	Headworks Building	1100	SF	\$ 120	\$ 70	\$ 209,000
2	Fine Screen	1	EA	\$ 53,000	\$ 16,000	\$ 69,000
3	Concrete for Mechanical Screen	40	CY	\$ 500	\$ 400	\$ 35,683
4	Grit Removal System	1	EA	\$ 330,000	\$ 40,000	\$ 370,000
5	Influent Pumps, wetwell, control	1	LS	\$ 150,000	\$ 100,000	\$ 250,000
6	Equipment Buildings	4000	SF	\$ 40	\$ 45	\$ 340,000
7	UV Disinfection	1	EA	\$ 135,000	\$ 100,000	\$ 235,000
8	Concrete for UV Channel	40	CY	\$ 500	\$ 400	\$ 36,000
9	Belt Filter Press	1	EA	\$ 415,500	\$ 80,000	\$ 495,500
10	Site Piping	1	LS	\$ 200,000	\$ 300,000	\$ 500,000
11	Effluent Pump Station & Force Main	1	LS	\$ 200,000	\$ 125,000	\$ 325,000
12	Aqua SBR	1	LS	\$ 514,230	\$ 250,000	\$ 764,230
13	Post Equalization Equipment	1	LS	\$ 220,385	\$ 100,000	\$ 320,385
14	Aerobic Holding Tank Equipment	1	LS	\$ 314,835	\$ 100,000	\$ 414,835
15	Concrete Tanks (SBR, PEQ, Aerobic Holding)	1,300	CY	\$ 500	\$ 400	\$ 1,170,000
16	Denite Equipment	1	LS	\$ 707,520	\$ 130,000	\$ 837,520
17	Concrete for Denite Equipment	120	CY	\$ 500	\$ 400	\$ 108,000
18	Concrete for Cascade Equipment	10	CY	\$ 500	\$ 400	\$ 9,000
19	Chemical Addition	1	LS	\$ 120,000	\$ 80,000	\$ 200,000
20	Process and Control Building	1	LS	\$ 600,000	\$ 350,000	\$ 950,000
				Subtotal		\$7,639,153
Conveyance System Improvements						
21	Demolition and Renovation at Existing WWTP	1	LS	\$ 75,000	\$ 225,000	\$ 300,000
22	Pumps, Controls, Renovations of Rob Vanary Park PS	1	LS	\$ 150,000	\$ 121,000	\$ 271,000
23	New Pump Station at Existing WWTP Site	1	LS	\$ 300,000	\$ 205,400	\$ 505,400
24	New Force Main (6" PVC)	6,800	LF	\$ 35	\$ 45	\$ 544,000
25	New Force Main (4" PVC)	100	LF	\$ 30	\$ 45	\$ 7,500
				Subtotal		\$1,627,900
General						
26	Construction Stake Out	0.5%			\$46,335	
27	E&S, SW management	1%			\$92,671	
28	Paving and Restoration	2%			\$185,341	
29	Electrical/HVAC/Mechanical (15%)	15%			\$1,390,058	
30	Bonds and Insurance (1%)	1%			\$92,671	
31	Mob and Demob (4%)	4%			\$370,682	
32	Contingency	25%			\$2,316,763	
				Total Construction	\$13,761,574	
				Subtotal	\$13,761,574	
33	Legal, Admin, Engineering, Design	10%			\$1,376,157.42	
34	Bidding, Construction Review, Inspection	5%			\$688,078.71	
				Total Project Cost		\$15,825,810

Project No.: 132201169
Project Name: Kent County Regional WWTP
By: AMW
CK By: DRS

**Kent County Regional WWTP - Preliminary Cost
Opinion Summary - 4 Stage Bardenpho**

Item No.	Description	Quantity	Unit	Unit Cost, \$		Total
				Material	Labor	
New WWTP Standard Equipment						
1	Headworks Building	1100	SF	\$ 120	\$ 70	\$ 209,000
2	Fine Screen	1	EA	\$ 53,000	\$ 16,000	\$ 69,000
3	Concrete for Mechanical Screen	40	CY	\$ 500	\$ 400	\$ 35,683
4	Grit Removal System	1	EA	\$ 330,000	\$ 40,000	\$ 370,000
5	Influent Pumps, wetwell, control	1	LS	\$ 150,000	\$ 100,000	\$ 250,000
6	Equipment Buildings	4000	SF	\$ 40	\$ 45	\$ 340,000
7	UV Disinfection	1	EA	\$ 135,000	\$ 100,000	\$ 235,000
8	Concrete for UV Channel	40	CY	\$ 500	\$ 400	\$ 36,000
9	Belt Filter Press	1	EA	\$ 415,500	\$ 80,000	\$ 495,500
10	Site Piping	1	LS	\$ 200,000	\$ 300,000	\$ 500,000
11	Effluent Pump Station & Force Main	1	LS	\$ 200,000	\$ 125,000	\$ 325,000
12	Biological Process Equipment	1	LS	\$ 760,000	\$ 250,000	\$ 1,010,000
13	Secondary Clarifier Equipment	1	LS	\$ 588,000	\$ 125,000	\$ 713,000
14	Aerobic Holding Tank Equipment	1	LS	\$ 314,835	\$ 100,000	\$ 414,835
15	Equalization Equipment	1	LS	\$ 220,385	\$ 100,000	\$ 320,385
16	Concrete Tanks for Biological Processes	842	CY	\$ 500	\$ 400	\$ 757,600
17	Concrete for Secondary Clarifiers	519	CY	\$ 500	\$ 400	\$ 467,469
18	Concrete for EQ and Aerobic Holding	640	CY	\$ 500	\$ 400	\$ 576,000
19	Denite Equipment	1	LS	\$ 707,520	\$ 130,000	\$ 837,520
20	Concrete for Denite Equipment	120	CY	\$ 500	\$ 400	\$ 108,000
21	Concrete for Cascade Equipment	10	CY	\$ 500	\$ 400	\$ 9,000
22	Chemical Addition	1	LS	\$ 120,000	\$ 80,000	\$ 200,000
23	Process and Control Building	1	LS	\$ 600,000	\$ 350,000	\$ 950,000
				Subtotal		\$9,228,992
Conveyance System Improvements						
24	Demolition and Renovation of Existing WWTP	1	LS	\$ 75,000	\$ 225,000	\$ 300,000
25	Pumps, Controls, Renovations of Rob Vanary Park PS	1	LS	\$ 150,000	\$ 121,000	\$ 271,000
26	New Pump Station at Existing WWTP Site	1	LS	\$ 300,000	\$ 205,400	\$ 505,400
27	New Force Main (6" PVC)	6,800	LF	\$ 35	\$ 45	\$ 544,000
28	New Force Main (4" PVC)	100	LF	\$ 30	\$ 45	\$ 7,500
				Subtotal		\$1,627,900
General						
29	Construction Stake Out	0.5%			\$54,284.46	
30	E&S, SW management	1%			\$108,568.92	
31	Paving and Restoration	2%			\$217,137.85	
32	Electrical/HVAC/Mechanical (15%)	15%			\$1,628,533.85	
33	Bonds and Insurance (1%)	1%			\$108,568.92	
34	Mob and Demob (4%)	4%			\$434,275.69	
35	Contingency	25%			\$2,714,223.08	
				Total Construction	\$16,122,485	
				Subtotal	\$16,122,485	
35	Legal, Admin, Engineering, Design	10%			\$1,612,248.51	
36	Bidding, Construction Review, Inspection	5%			\$806,124.25	
				Total Project Cost		\$18,540,858

APPENDIX D:

EXISTING MILLINGTON WWTP PERMIT

Millington Discharge Permit - through 12/31/22

Effluent limits based on 0.105 MGD capacity	Annual Load Max (lb)	Growing Season Load Max (lb/season) (5/1 to 10/31)
Total-P	957	483
Total-N	5744	2896
Effluent limits based on 0.14 MGD capacity	Annual Load Max (lb)	
Total-P	457	
Total-N	3344	

Millington WWTP MORDMRs Average Concentrations			
T-P	0.18	mg/L	
T-N	5.88	mg/L	
Nutrient Load Limiting Values			
N	3	mg/L	*standard effluent concentration
P	0.3	mg/L	*standard effluent concentration
N	9	lb per day	*Load limit per permit (0.14 MGD)
N	366,173	GPD	*max flow within TMDL
P	1.25	lb per day	*Load limit per permit (0.14 MGD)
P	500,422	GPD	*max flow within TMDL
N	16	lb per day	*Load limit per permit (0.105 MGD)
N	628,976	GPD	*max flow within TMDL
P	2.62	lb per day	*Load limit per permit (0.105 MGD)
P	1,047,929	GPD	*max flow within TMDL

Worton Discharge Permit - through 11/30/23

Effluent limits based on 0.25 MGD capacity	Annual Load Max (lb)	Growing Season Load Max (lb/season) (5/1 to 10/31)
Total-P	228	90
Total-N	3631	1816

Nutrient Load Limiting Values			
N	3	mg/L	*standard effluent concentration
P	0.3	mg/L	*standard effluent concentration
N	10	lb per day	*Load limit per permit (0.25 MGD)
N	397,600	GPD	*max flow within TMDL
P	0.62	lb per day	*Load limit per permit (0.25 MGD)
P	249,663	GPD	*max flow within TMDL



Maryland

Department of the Environment

Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

January 16, 2018

CERTIFIED MAIL

Elizabeth Jo Manning, Town Administrator
Town of Millington
P.O. Box 330
Millington, MD 21651

RE: Discharge Permit for Millington Wastewater Treatment Plant
State Discharge Permit 15-DP-0166, NPDES Permit MD0020435

Dear Ms. Manning:

It has been brought to our attention via a letter dated January 11, 2018 by Maryland Environmental Service (MES), operator of the above mentioned facility, that the recent discharge permit (15-DP-0166) needed the following: clarification regarding monitoring for bacteria, corrections to typographical errors regarding nutrients, and clarification regarding reporting of growing season loads. Regarding the above mentioned issues; on page 10, footnote 17 was added and footnote 17 was added to E.coli and Enterococci on page 9; the typographical error on page 7 and page 8 were corrected; and footnote 12 on page 10 was revised. The above mentioned are the only revisions to the permit.

Enclosed please find the pages with the above mentioned corrections. Please note these pages replace the same pages of the discharge permit.

Should you any questions or need more information, please contact me immediately at (410) 537-3363 or Elita B. Castleberry, at (410) 537-4113.

Sincerely,

Yen-Der, Cheng, Chief
Municipal Surface Discharge Permits Division

Enclosure

cc: Mr. Mark Smith, U.S. Environmental Protection Agency (through electronic copy)
John Nickerson, Director, Environmental Health, Queen Anne's County Health Department
Compliance Program's Eastern Division Chief
Mr. Bill Lee (through electronic copy)
Mr. Matt Rowe, SSA
Mr. Dennis Rasmussen
Mr. Jay Janney, MES



Maryland

Department of the Environment

Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

DEC 14 2017

CERTIFIED MAIL

Elizabeth Jo Manning, Town Administrator
Town of Millington
P.O. Box 330
Millington, MD 21651

Re: Millington Wastewater Treatment Plant (WWTP)
State Discharge Permit 15-DP-0166; NPDES Permit MD0020435

Dear Ms. Manning:

Enclosed is the above discharge permit with the effective date indicated on the cover page. The permittee is responsible for complying with all permit conditions. You are therefore advised to read the permit carefully and become thoroughly familiar with the requirements in order to maintain compliance with the permit.

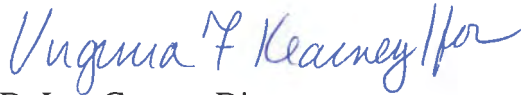
Your facility has been approved by MDE to electronically submit Discharge Monitoring Report (DMR) through NetDMR. Therefore you are required to submit monthly DMRs by the 28th of the following month and all other documents as listed in the discharge permit electronically through NetDMR. Should you encounter problems in electronic submission for any month, please consult the MDE's Compliance Program by calling at (410) 537-3510 to avoid missing the deadline for submission of the above stated documents.

You will also find enclosed a copy of the Federal Register published on May 18, 2012 updating the Code of Federal Regulations (CFR), Title 40, Part 136 - "Guidelines Establishing Test Procedures for Analysis of Pollutants". For future update of 40 CFR, Part 136, please visit the U.S Government Publishing Office (GPO) website (http://bit.ly/40CFR_Part136, this link is case-sensitive). Unless otherwise specified, these guidelines are to be used for the analyses of pollutants required by this permit.

Ms. Manning
Page 2

If you have any questions, please contact Elita Castleberry, Project Manager, Surface Discharge Permits Division, at (410) 537-4113.

Sincerely,

A handwritten signature in blue ink that reads "Virginia F. Kearney" followed by a stylized flourish.

D. Lee Currey, Director
Water and Science Administration

Enclosures

cc: Mark Smith, USEPA (through electronic copy)
Mr. John Nickerson, Director, Environmental Health, Queen Anne's County Health
Department
Compliance Program's Eastern Division Chief
Ms. Chantelle Watkins (Permit cover page only)
Mr. Bill Lee (through electronic copy)
Mr. Matt Rowe (through electronic copy)
Mr. Dennis Rasmussen



Maryland

Department of the Environment

Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

DISCHARGE PERMIT

**NPDES Discharge
Permit Number:** MD0020435

**State Discharge
Permit Number:** 15-DP-0166

**Effective
Date:** 01/01/2018

**Expiration
Date:** 12/31/2022

**Modification
Date:** (Not
applicable)

**Reapplication Due
Date:** 12/31/2021

Pursuant to the provisions of Title 9 of the Environment Article, Annotated Code of Maryland, and regulations promulgated thereunder, and the provisions of the Clean Water Act, 33 U.S.C. Section 1251 et seq., and implementing regulations 40 CFR Parts 122, 123, 124 and 125, the Department of the Environment hereby establishes conditions and requirements pertinent to the wastewater treatment plant and collection system and authorizes:

Town of Millington
P.O. Box 330
Millington, MD 21651

TO DISCHARGE FROM: Millington Wastewater Treatment Plant (WWTP)

LOCATED AT: 227 Sassafras Street
Millington, Queen Anne's County, MD 21651

THROUGH OUTFALL: 001A (WWTP Effluent)

TO: the Chester River, designated as Use II: (non-shellfish harvesting) water which is protected for estuarine and marine aquatic life; in accordance with the following special and general conditions and a map incorporated herein and made a part hereof.

I. DEFINITIONS

- A. “Ambient temperature” of the effluent receiving stream means the water temperature that is not impacted by a point source discharge, and it shall be measured in areas of the stream representative of typical or average conditions of the stream segment in question.
- B. “Bypass” means the intentional diversion of pollutants from any portion of a treatment or collection facility.
- C. “BOD₅ (Biochemical Oxygen Demand)” means the amount of oxygen consumed in a standard BOD₅ test without the use of a nitrification inhibitor at 20 degree centigrade on an unfiltered sample.
- D. “Clean Water Act” means the Federal Water Pollution Control Act, as amended, 33 U.S.C. Section 1251 et seq.
- E. “CFR” means the Code of Federal Regulations.
- F. “COMAR” means the Code of Maryland Regulations.
- G. “Department” means the Maryland Department of the Environment (MDE).
- H. Discharge Limits
 - 1. “Daily *maximum* (or *minimum*)” limitation means the *highest* (or *lowest*) allowable the daily averages in a calendar month. The daily discharge expressed as concentration (in mg/l) shall be calculated by dividing total of measurement readings by number of sample collected during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge expressed as loading rate (in pounds/day) is calculated by using this formula {daily average concentration (mg/l) x the same day total flow (in million gallons) x 8.34}.
 - 2. “Maximum weekly average” limit means the highest allowable weekly averages in a month. Each individual weekly average concentration of a parameter shall be calculated by dividing the total concentrations of all samples for a parameter by the number of samples collected and measured in the same calendar week. The weekly average loading rate of a parameter (in pounds/day) is calculated by using the formula {(weekly average concentration, mg/l x total weekly flow, million gallons (MG) x 8.34)/7.0}. The calendar week runs from Sunday through Saturday. If a week spans two calendar months, the individual weekly average for that week shall be included as the first weekly average in the second month Discharge Monitoring Report (DMR). For example, the weekly average for Sunday, June 27 through Saturday, July 3 will be included in the DMR for July).

I. DEFINITIONS

3. “Monthly average *maximum* (or *minimum*)” limitation means the *highest* (or *lowest*) allowable monthly average concentration or waste load of a parameter over a calendar month. The monthly average is calculated as the sum of all daily discharges for a parameter sampled and/or measured in that calendar month divided by the number of days on which monitoring was performed.
4. “Minimum or maximum” limit means the lowest or highest allowable value measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling.
5. “Monthly loading rate (in pounds/month)” means the total load of a parameter calculated for that calendar month. It is calculated using this formula $\{(\text{monthly average concentration in mg/l}) \times (\text{Total monthly flow in Million Gallons}) \times 8.34\}$.
6. “Year-to-date cumulative load (pounds)” value means cumulative load of a pollutant in the effluent through each reporting month in a calendar year. It is calculated as a sum of the individual total monthly loads from January through the reporting month in a calendar year.
7. “Annual Maximum Loading Rate (in pounds/year)” limit means the maximum load allowed for a pollutant in the effluent to be discharged in a calendar year. The Year-to-date cumulative load (as defined above in Definition I.H.6) shall be used to determine the compliance status of this requirement.
8. “Monthly log mean (Monthly geometric mean)” limit means the highest allowable value calculated as the logarithmic or geometric mean of all samples taken in the calendar month. The geometric mean is the antilogarithm of the mean of the logarithms.

I. Discharge Monitoring

1. “Composite sample” means a combination of individual samples obtained at hourly or smaller intervals over a time period. Either the volume of each individual sample is proportional to discharge flow rates or the sampling interval (for constant volume samples) is proportional to the flow rates over the time period used to produce the composite.
2. “Grab sample” means an individual sample collected over a period of time not exceeding 15 minutes.
3. “Estimated flow” value means a calculated volume or discharge rate which is based on a technical evaluation of the sources contributing to the discharge including, but not limited to, pump capabilities, water meters, and batch discharge volumes.

I. DEFINITIONS

4. "Measured flow" value means any method of liquid volume measurement, the accuracy of which has been previously demonstrated in engineering practice, or for which a relationship to absolute volume has been obtained.
 5. "Recorded flow" means any method of providing a permanent, continuous record of flow including, but not limited to, circular and strip charts.
 6. "Monthly average flow" means the total flow for a calendar month divided by the number of days in the same month.
- J. "i-s (immersion stabilization)" means a calibrated device immersed in the effluent or stream, as applicable, until the temperature reading is stabilized.
- K. "NetDMR" means a nationally-available electronic reporting tool, initially designed by states and later adapted for national use by EPA, which can be used by NPDES-regulated facilities to submit discharge monitoring reports (DMRs) electronically to EPA through a secure Internet application over the National Environmental Information Exchange Network (NEIEN). EPA can then share this information with authorized states, tribes, and territories.
- L. "NPDES (National Pollutant Discharge Elimination System)" means the national system for issuing permits as designated by the Clean Water Act.
- M. "Nondetectable Level" for total residual chlorine means a residual concentration of less than 0.10 mg/l as determined using either the DPD titrimetric or chlorimetric method or an alternative method approved by the Department.
- N. "Outfall" means the location where the effluent is discharged into the receiving waters.
- O. "Overflow" means any loss of wastewater or discharge from a sanitary sewer system, combined sewer system or wastewater treatment plant bypass (as defined in I.B) which results in the direct or potential discharge of raw, partially treated wastewater into the waters of the State.
- P. "Permittee" means an individual or organization holding the discharge permit issued by the Department.
- Q. "POTW" means a publicly owned treatment works.
- R. "Sampling Point" means the effluent sampling location in the outfall line(s) downstream from the last addition point or as otherwise specified.
- S. "Sanitary Sewer Overflow (SSO)" means a discharge of untreated or partially treated sewage from a separate sewer system before the sanitary wastewater reaches the headworks of a wastewater treatment facility, pursuant to COMAR 26.08.10.01.

I. DEFINITIONS

- T. “Significant Industrial User (SIU)” is defined as any industrial user (IU) that:
1. is subject to national categorical standards; and
 2. any other IU that:
 - a. discharges an average of 25,000 gallons per day or more of process wastewater (excluding sanitary, non-contact cooling and boiler blowdown wastewater); or
 - b. contributes a process wastestream that makes up 5% or more of the average dry weather hydraulic or organic capacity of the POTW; or
 - c. is designated as such by the POTW on the basis that the IU has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement; or
 - d. is found by the POTW, the Department, or the Environmental Protection Agency (EPA) to have significant impact either individually or in combination with other contributing industries to the POTW, on the quality of the sludge, the POTW's effluent quality, or air emissions generated by the system.
- U. “TKN (Total Kjeldahl Nitrogen)” means organic nitrogen plus ammonia nitrogen.
- V. “TSS (Total Suspended Solids)” means the residue retained on the filter by an analysis done in accordance with Standard Methods or other approved methods.
- W. “Upset” means the exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation

II. SPECIAL CONDITIONS

A(1). Effluent Limitations for the Existing Facility with the Design Capacity of 0.105 MGD, Outfall 001A ^{(1) (2) (3) (4)}

The quality of the effluent discharged by the facility at a discharge point location- 001A shall be limited at all times as shown below:

<u>Effluent Characteristics</u>	<u>Maximum Effluent Limits</u>					
	<u>Monthly Average Loading Rate, Pounds/day</u>	<u>Weekly Average Loading Rate, Pounds/day</u>	<u>Daily Average Loading Rate, Pounds/day</u>	<u>Monthly Average Concentration, mg/l</u>	<u>Weekly Average Concentration, mg/l</u>	<u>Daily Average Concentration, mg/l</u>
BOD ₅	26	39	N/A	30	45	N/A
TSS	26	39	N/A	30	45	N/A

<u>Effluent Characteristics</u>	<u>Maximum Effluent Limits</u>			
	<u>Total Monthly Loading Rate, Pounds/Month</u>	<u>Annual Maximum Loading Rate, Pounds/Year</u>	<u>Growing Season (5/1 to 10/31) Maximum Loading Rate, Pounds/Growing Season</u>	<u>Monthly Average Concentration, mg/l</u>
Total Phosphorus-P ^{(4) (5) (6)}	REPORT	957	483	REPORT
Total Nitrogen-N ^{(4) (5) (6)}	REPORT	5,744	2,896	REPORT

<u>Effluent Characteristics</u>	<u>Effluent Limits</u>	
	<u>Maximum</u>	<u>Minimum</u>
E. Coli ⁽⁸⁾	126 MPN/ 100 ml monthly geometric mean value	N/A
Enterococci ⁽⁸⁾	57 MPN/100 ml monthly geometric mean value	N/A
Total Residual Chlorine ⁽⁷⁾	(See footnote- 7)	N/A
pH	8.5	6.5
Dissolved Oxygen (All Year)	N/A	5.0 mg/l at anytime
(All Year)	N/A	5.5 monthly average
(2/1 – 5/31)	N/A	6.0 mg/l weekly average

An annual average flow of 0.105 million gallons per day (mgd) was used in waste allocation calculations (expressed as waste loading rate limit), and this unit shall be used when reporting on the Discharge Monitoring Report (DMR) as required by General Condition III.A.2. Notification is to be provided to the Department at least 180 days before the annual average flow is expected to exceed this flow level. If a permit modification is required, the Department will initiate the public participation NPDES process.

II. SPECIAL CONDITIONS

A(2). Effluent Limitations for Expanded Facility with the Design Capacity of 0.140 MGD, Outfall 001A ^{(1) (2) (3) (4)}

The limitations on this page shall be applicable after the appropriate upgrades and expansion of the facility to provide a design capacity of at least 0.140 MGD is completed and becomes operational. The permittee shall notify the MDE's Compliance Program at least 30 days in advance of the commencement date of the newly expanded facility starts discharging through outfall -001A.

The quality of the effluent discharged by the facility at a discharge point location- 001A shall be limited at all times as shown below:

Maximum Effluent Limits						
<u>Effluent Characteristics</u>	<u>Monthly Average Loading Rate, Pounds/day</u>	<u>Weekly Average Loading Rate, Pounds/day</u>	<u>Daily Average Loading Rate, Pounds/day</u>	<u>Monthly Average Concentration, mg/l</u>	<u>Weekly Average Concentration, mg/l</u>	<u>Daily Average Concentration, mg/l</u>
BOD ₅	26	39	N/A	23	34	N/A
TSS	26	39	N/A	23	34	N/A

Maximum Effluent Limits			
<u>Effluent Characteristics</u>	<u>Total Monthly Loading Rate, Pounds/Month</u>	<u>Annual Maximum Loading Rate, Pounds/Year</u>	<u>Monthly Average Concentration, mg/l</u>
Total Phosphorus-P ^{(4) (5) (6)}	REPORT	457	REPORT
Total Nitrogen-N ^{(4) (5) (6)}	REPORT	3,344	REPORT

Effluent Limits		
<u>Effluent Characteristics</u>	<u>Maximum</u>	<u>Minimum</u>
E. Coli ⁽⁸⁾	126 MPN/ 100 ml monthly geometric mean value	N/A
Enterococci ⁽⁸⁾	57 MPN/100 ml monthly geometric mean value	N/A
Total Residual Chlorine ⁽⁷⁾	(See footnote- 7)	N/A
pH	8.5	6.5
Dissolved Oxygen (All Year)	N/A	5.0 mg/l at anytime
(All Year)	N/A	5.5 monthly average
(2/1 – 5/31)	N/A	6.0 mg/l weekly average

An annual average flow of 0.140 million gallons per day (mgd) was used in waste allocation calculations (expressed as waste loading rate limit), and this unit shall be used when reporting on the Discharge Monitoring Report (DMR) as per the General Condition III.A.2. Notification is to be provided to the Department at least 180 days before the annual average flow is expected to exceed this flow level. If a permit modification is required, the Department will initiate the public participation NPDES process.

II. SPECIAL CONDITIONS

Footnotes for effluent limitations:

(1) When this permit is renewed, the new limitations may not be equal to the above limitations.

(2) There shall be no discharge of floating solids or visible foam other than trace amounts.

(3) The permit may also be reopened in accordance with the requirements of MDE's Watershed Permitting Plan under which all discharge permits in a watershed are issued the same year.

(4) The Upper Chester River is on the 303(d) list as the impaired waters for: Total Suspended Solids, Total Phosphorous, Total Nitrogen, Enterococcus and Mercury.

A Total Maximum Daily Load (TMDL), approved by the EPA on 3/18/2011, allocated a E. coli limits of 200 MPN/100ml monthly log mean and the corresponding Enterococci concentration estimate based on the regression equation is 57 MPN/100 ml monthly log mean to this facility; effluent limitation for E. coli at 126 MPN/100 ml was set equal to the receiving stream standards for discharges to Use II water, the E. coli limit is in conformance with the TMDL. The E. coli limit shall be applicable until the Enterococci limit goes into effect. The Enterococci limit shall go into effect after a period of one year from the effective date of the permit.

A TMDL, revised final document approved by the EPA on 10/4/2013, allocated a Total Nitrogen (TN) and Total Phosphorous (TP) annual limits of 5,744 lb/yr and 957 lb/yr and growing season (May 1 to October 31) limits of 2,896 lb/season and 483 lb/season for a flow of 0.105 MGD. The TN and TP limits are in conformance with this TMDL.

This permit is in conformance with the “**Chesapeake Bay TMDL for Nitrogen, Phosphorus and Sediment**” established on December 29, 2010 and with Maryland’s Chesapeake Bay Tributary Strategy Statewide Implementation Plan dated January 24, 2008.

When TMDLs for other remaining parameters are completed, limits may be imposed, after the public participation process, to incorporate any TMDL requirements.

(5) Under the Maryland Chesapeake Bay Tributary Strategy Statewide Implementation Plan for expanding non-significant facilities, the Millington WWTP has been assigned the Annual Maximum nutrient loads of 3,344 lbs/year for total nitrogen (TN) and 457 lbs/year for total phosphorus (TP), and they have been incorporated as limitations upon the capacity expansion to increase flow from 0.105 MGD to 0.140 MGD. The permittee shall make every effort to optimize the operation of the existing WWTP to meet the TN and TP loading rate limits.

The first exceedance of the permit limit shall be counted and reported as daily exceedances beginning from the first exceedance, determined to the nearest day, through December 31. In addition, after any such exceedance, the permittee shall demonstrate to the Department's satisfaction that the facility is optimizing its nutrient removal capability, and neither the arrival of the next calendar year nor the issuance of a permit renewal during a period of noncompliance shall obviate continuance of any noncompliance status related to treatment optimization requirements.

(6) The permittee may request that the permit be reopened and modified to include nutrient trading consistent with all applicable regulations in effect at that time.

(7) Total residual chlorine limitation of **the nondetectable level** shall be applicable, when chlorine or any chlorine-containing compound is used in any treatment process(es), including but not limited to disinfection, that could become a potential constituent of the effluent discharged from the Millington WWTP. The wastewater shall be dechlorinated to reduce effluent total residual chlorine concentration to the nondetectable level (See definition I.M).

(8) E.coli limit of 126 MPN/100 ml shall be applicable until the Enterococci limit goes into effect. The Enterococci limit shall go into effect after a period of one year from the effective date of the permit.

II. SPECIAL CONDITIONS

B. Minimum Monitoring Requirements:

The effluent characteristics listed below in Table B shall be monitored at the sampling point (Definition I.R). If the sampling point is other than the outfall- 001A, the permittee shall ensure that the effluent samples are representative of the effluent quality being discharged at the outfall- 001A.

<u>Effluent Characteristics</u>	<u>Monitoring Period</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
BOD ₅ ⁽⁹⁾	All Year	One per week	24-hour composite
Total Suspended Solids ⁽⁹⁾	All Year	One per week	24-hour composite
Total Ammonia Nitrogen as N ⁽⁹⁾⁽¹⁰⁾⁽¹¹⁾	All Year	One per week	24-hour composite
Total Phosphorus as P ⁽⁹⁾⁽¹⁰⁾⁽¹²⁾	All Year	One per week	24-hour composite
Total Nitrogen as N ⁽⁹⁾⁽¹⁰⁾⁽¹¹⁾⁽¹²⁾	All Year	One per week	Calculated
(Nitrite + Nitrate) as N ⁽⁹⁾⁽¹⁰⁾⁽¹¹⁾	All Year	One per week	24-hour composite
Organic Nitrogen as N ⁽⁹⁾⁽¹⁰⁾⁽¹¹⁾	All Year	One per week	24-hour composite
Orthophosphate as P ⁽⁹⁾⁽¹⁰⁾	All Year	One per month	24-hour composite
E. Coli ⁽⁹⁾⁽¹⁷⁾	All Year	One per week	Grab
Enterococci ⁽⁹⁾⁽¹⁷⁾	All Year	One per week	Grab
Total Residual Chlorine ⁽⁹⁾⁽¹³⁾	All Year	One per day	Grab
Dissolved Oxygen ⁽⁹⁾	All Year	One per day	Grab
pH ⁽⁹⁾	All Year	One per day	Grab
Flow ⁽⁹⁾⁽¹⁴⁾⁽¹⁵⁾	All Year	Continuous	Recorded ⁽¹⁵⁾
Total Monthly Flow ⁽⁹⁾⁽¹⁶⁾	All Year	Monthly	Calculated ⁽¹⁶⁾

II. SPECIAL CONDITIONS

B Minimum Monitoring Requirements, continued:

Footnotes for the monitoring requirements, continued:

- (9) "STORET" (short for STOrage and RETrieval) is a widely-used repository for water quality data reporting and monitoring. The STORET codes for the effluent characteristics described as limitations and/or monitoring requirements are: BOD₅ (00310), Total Suspended Solids (00530), Total Ammonia Nitrogen as N (00610), Total Phosphorus as P (00665), Total Nitrogen as N (00600), (Nitrite + Nitrate) as N (00630), Organic Nitrogen as N (00605), Orthophosphate as P (04175), E. Coli (51040), Enterococci (61211), Total Residual Chlorine (50060), Dissolved Oxygen (00300), pH (00400), Flow (50050), and Total monthly flow (82220).
- (10) This parameter (without effluent limitations) must be monitored, and it shall be reported on the Monthly Operating Report (MOR) as individual results and on the Discharge Monitoring Report as monthly average concentrations.
- (11) Total nitrogen as N (in mg/l) is a calculated parameter as the sum of individual results for total ammonia nitrogen as N, organic nitrogen as N and (nitrite + nitrate) as N. All the nitrogen species must be sampled on the same day.
- (12) The permittee shall also calculate and report on the DMR the TN and TP total monthly loads (Definition I.H.5) plus year-to-date cumulative loads (Definition I.H.6) for the calendar year in question for the outfall- 001A.
- For each calendar year, the year-to-date cumulative loads of TN and TP for the month of December shall represent the total annual loads, and they must be incorporated toward complying with the respective annual maximum load limits. The cumulative loads for the growing season (May 1 to October 31) shall be reported on the corresponding monthly DMRs to comply with the growing season loading rate limits.
- (13) The Minimum monitoring requirements of one per day-grab samplings for total residual chlorine shall be applicable, when chlorine or any chlorine compound is used in any treatment process(es), including but not limited to disinfection, that could become a potential constituent of the effluent discharged from the Millington WWTP. The minimum detection level (quantification level) for total residual chlorine is 0.10 mg/l. The permittee may report all results below the minimum level as <0.10 mg/l. All results reported below the minimum level shall be considered in compliance.
- (14) Flows shall be reported in millions gallons per day (mgd) to at least the nearest 1,000 gallons per day. (Example: A flow of 524,699 gallons per day shall be reported as 0.525 mgd.). For each calendar month, flows shall be reported on the MOR as daily individual results and on the DMR as monthly average (mgd) and daily maximum (mgd)).
- (15) Continuous electronic flow measurement and recording which can produce a permanent record are acceptable to the Department.
- (16) Total monthly flow is a calculated parameter equal to sum of the daily flow results in a calendar month. It shall be reported on the monthly DMR as Total monthly flow in millions gallons (MG) to at least the nearest 1,000 gallons. (Example: A flow of 15,524,699 gallons shall be reported as 15.525 MG).
- (17) E.coli monitoring shall be conducted until the Enterococci limit becomes effective, at that time, E. coli monitoring will cease and Enterococci monitoring shall be conducted.

II. SPECIAL CONDITIONS

C. Wastewater Capacity Management

The permittee shall report the total cumulative flow for the each calendar year for the above referenced facility. The total cumulative flow shall be reported in million gallons for the entire calendar year to the nearest ten thousand gallons. The annual total cumulative flow determination shall be provided to the Department using NetDMR no later than January 28th of the following year.

If the most recent three year average flow is over 80% of its design capacity or if it is anticipated to exceed 80 % in the following year, a Wastewater Capacity Management Plan (WCMP) must be submitted to the Department using NetDMR no later than January 28 of the following year. Thereafter, the “Wastewater Flow Capacity Report (WFCR)” and “worksheet for WFCR” shall be submitted to the Department using NetDMR tool no later than January 28th of each year. The permittee can obtain the WCMP guidance document and forms from the Department’s web site links listed below: (a) <http://9nl.at/MD-CMPGuidance> for WCMP guidance document, (b) <http://9nl.at/MD-CMPFlowCapReport> for WFCR, (c) <http://9nl.at/MD-CMPWorksheet1> for WFCR’s Worksheet # 1, and (d) <http://9nl.at/MD-CMPWorksheet2> for WFCR’s Worksheet # 2 (these links are case-sensitive).

If the permittee prefers to provide the above documents in hard copies, they shall be provided to the Department postmarked by January 28th of the following year to the address below:

Attention: Calendar Year Total Cumulative Flow
Water and Science Administration (WSA)
Wastewater Discharge Permits Program
Maryland Department of the Environment
1800 Washington Boulevard, STE-455
Baltimore, MD 21230-1708

The permittee is advised to notify the Department at the above address immediately upon electronic submission of reports through NetDMR tool.

D. Influent Restriction

1 The permittee is not authorized to receive the discharge of any type or quantity of substances which may cause interference with the operation of the treatment works. The permittee is required to notify the Pretreatment Section of the Department, in writing, prior to allowing:

- a. Any new introduction of pollutants into the treatment works from an indirect discharger which would be subject to Section 301 or 306 of the

II. SPECIAL CONDITIONS

Clean Water Act and COMAR 26.08.08 if it were directly discharging those pollutants; and

- b. Any substantial change in the volume or character of pollutants being introduced into the treatment works by a source at the time of issuance of this permit.

- 2 Adequate notice shall include information on (i) the quality, quantity and frequency of wastewater introduced into the treatment works, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the treatment works. The permittee shall also maintain an updated list of indirect dischargers which shall be available upon the request of the Department. Under no circumstances shall the permittee allow introduction of the following wastes into the waste treatment system:
 - a. Pollutants which cause pass through or interference;
 - b. Pollutants which create a fire hazard or explosion hazard in the sewerage system, including, but not limited to waste streams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21;
 - c. Pollutants which will cause corrosive structural damage to the sewerage system; but in no case, discharges with pH less than 5.0, unless the works is specifically designed to accommodate such discharges;
 - d. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the sewerage system resulting in interference;
 - e. Any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the treatment plant;
 - f. Heat in amounts which will inhibit biological activity in the treatment plant resulting in interference; but in no case, heat in such quantities that the temperature at the treatment plant exceeds 90 degrees Fahrenheit (32 degrees Centigrade) unless the Pretreatment Section of the Department, upon request of the permittee, approves alternate temperature limits;
 - g. Pollutants which result in the presence of toxic gases, vapors or fumes within the sewerage system in a quantity that may cause acute worker health and safety problems; and
 - h. Any trucked or hauled wastewater is prohibited, except for (1) domestic septage, (2) wastewater from within the collection system or within the wastewater treatment works due to blockage, breaks or malfunction in the system, (3) drinking water plant wastewater, or, (4) other sources specifically authorized by the Department. Prior to the acceptance of

II. SPECIAL CONDITIONS

any trucked waste other than those listed in this section, the permittee must make an official written request and, if approved by the Department, must follow the conditions specified in permit requirements which may be modified or rescinded at the discretion of the Department for any reason.

E. Protection of Water Quality

It is a violation of this permit to discharge any substance not otherwise listed under the permit's "Effluent Limitations and Monitoring Requirements" special conditions at a level which would cause or contribute to any exceedance of the numerical water quality standards in COMAR 26.08.02.03 unless the level and the substance were disclosed in writing in the permit application prior to the issuance of the permit. If a discharge regulated by this permit causes or contributes to an exceedance of the water quality standards in COMAR 26.08.02.03, including but not limited to the general water quality standards, or if the discharge includes a pollutant that was not disclosed or addressed in the public record for the permit determination, the Department is authorized to modify, suspend or revoke this permit or take enforcement action to address unlawful discharges of pollutants.

F. Reapplication for a Permit

No later than **12 months** before the expiration date of this permit, unless permission for a later date has been granted by the Department, the permittee shall submit a new application for a permit or notify the Department of the intent to cease discharging by the expiration date. In the event that a timely and complete reapplication has been submitted and the Department is unable, through no fault of the permittee, to issue a new permit before the expiration date of this permit, the terms and conditions of this permit continue and remain fully effective and enforceable. The renewal application is required by that date in accordance with the requirements of MDE's Watershed Permitting Plan under which all discharge permits in a watershed should be issued in the same year.

III. GENERAL CONDITIONS

A. Monitoring and Reporting

1. Representative Sampling

Samples and measurements shall be taken at times that are representative of the quantity and quality of the discharge, and at evenly spaced intervals.

2. Monthly Monitoring Results

a. Discharge Monitoring Reports

Monitoring results obtained during each calendar month shall be summarized and submitted electronically using the NetDMR tool. Results shall be submitted to the Department via NetDMR no later than the 28th of the month following the end of the reporting month.

b. Monthly Operating Reports (MOR)

The permittee shall submit monthly operating reports on a form acceptable to the Compliance Program. For each calendar month, the permittee shall submit to the Department a signed original of the MOR as an attachment to Copy of Record (COR) via NetDMR in electronic format concurrently with the Discharge Monitoring Report submission postmarked no later than the 28th day of the month following the reporting month.

c. Toxic Chemical Reporting

Any data collected according to the Department's "Toxic Pollutant Monitoring Protocol and Reporting Requirements for Toxic Chemical Testing Analytical Data" (05/18/2011) being submitted to the Department, either in fulfillment of Special Conditions II.B or pursuant to the toxic chemical testing requirement, pretreatment requirements or toxic metals or organic data collected on a voluntary basis, must be accompanied by laboratory data reports. At a minimum, these reports shall include, the name of the facility, the date(s) of sampling, beginning and ending sample time, place of sampling collection, the sample type (grab, composite, etc.), the sample description (influent or effluent), the preservation method, the analytical method used for each parameter, the analytical method detection limit, the date of analysis, the name of person performing the analysis, the analytical result, and the name and address of the laboratory performing the analyses. Chain-of-custody forms shall also be submitted.

III. GENERAL CONDITIONS

If the permittee prefers to submit hard copy of this information along with the supporting documentations instead of the electronic submission via NetDMR tool, they shall be submitted to:

Attention: Toxic Chemical Data
WSA – Compliance Program
Maryland Department of the Environment
1800 Washington Boulevard, STE 420
Baltimore, Maryland 21230-1708

3. Sampling and Analysis Methods

Analytical and sampling methods shall conform to test procedures for the analysis of pollutants as identified in 40 CFR Part 136 - "Guidelines Establishing Test Procedures for the Analysis of Pollutants."

4. Analytical Laboratory

Within 30 days after the effective date of this permit, the permittee shall submit to the Department the name and address of the analytical laboratory (including the permittee's own laboratory) which is used to perform the monitoring required by this permit.

If the laboratory changes during the effective period of this permit, the permittee shall notify the Department of the new laboratory within 30 days after the change.

5. Monitoring Equipment Maintenance

- a. The permittee shall calibrate and maintain all monitoring and analytical instrumentation to ensure accuracy of measurements.
- b. Environment Article, Section 9-343 provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

6. Recording of Results

For each measurement or sample taken pursuant to the requirements of the permit, the permittee shall record the following information:

- a. the date, exact place and time of sampling or measurement;

III. GENERAL CONDITIONS

- b. the person(s) who performed the sampling or measurement;
- c. the dates analyses were performed;
- d. the person(s) who performed each analysis;
- e. the analytical techniques or methods used; and
- f. the results of such analyses.

7. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report. The increased frequency shall also be reported. The results of any other monitoring performed by the permittee shall be made available to the Department upon request.

8. Record Retention

All data used to complete the permit application and all records and information resulting from the monitoring activities required by this permit, including all records of sampling and analyses performed, calibration and maintenance of instrumentation, and recordings from continuous monitoring instruments, shall be retained for a minimum of three years. This period shall be extended automatically during the course of litigation or when requested by the Department.

B. General Requirements

1. Permit Noncompliance - Notification Requirements

All discharges authorized herein shall be consistent with the terms and conditions of this permit. If, for any reason, the permittee does not comply with or will be unable to comply with any permit condition, the permittee shall, within 24 hours, notify the Department by telephone at (410) 537-3510 during work hours or at (866) 633-4686 during evenings, weekends, and holidays. The permittee shall provide the Department with the following information in writing within five days of such oral notification.

- a. a description of the noncomplying discharge including the name of the stream and the impact upon the receiving waters;

III. GENERAL CONDITIONS

- b. cause of noncompliance;
- c. the duration of the period of noncompliance and the anticipated time the condition of noncompliance is expected to continue;
- d. steps taken by the permittee to reduce and eliminate the noncomplying discharge;
- e. steps to be taken by the permittee to prevent recurrence of the condition of noncompliance;
- f. a description of the accelerated or additional monitoring to determine the nature and impact of the noncomplying discharge; and
- g. the results of the monitoring described in f. above.

2. Change in Discharge

The permittee shall report any anticipated facility expansions, production increases, or process modifications which will result in new, different or an increased discharge of pollutants by submitting a new application at least 180 days prior to the commencement of the changed discharge except that if the change only affects a listed pollutant and will not violate the effluent limitations specified in this permit, by providing written notice to the Department. Following such notice, the permit may be modified by the Department to include new effluent limitations on those pollutants.

3. Facility Operation and Quality Control

All waste collection, control, treatment and disposal facilities shall be operated in a manner consistent with the following:

- a. Facilities shall be operated efficiently to minimize upsets and discharges of excessive pollutants.
- b. The permittee shall provide an adequate operating staff qualified to carry out operation, maintenance and testing functions required to ensure compliance with this permit. Superintendents and operators must be certified by the Board of Waterworks and Waste Systems Operators located at Montgomery Park Business Center, 1800 Washington Boulevard, STE- 410, Baltimore, Maryland 21230 in accordance with Title 12 of Environmental Article, Annotated Code of Maryland, and Section 26.06.01 of the COMAR.

III. GENERAL CONDITIONS

- c. Facility maintenance work, which adversely affects or may adversely affect the discharge quality shall be scheduled during non-critical water quality periods.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to waters of this State, human health or the environment resulting from noncompliance with any effluent limitations specified in this permit, and must perform accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Bypassing

Any bypass of treatment facilities is prohibited unless the bypass does not cause any violations of the effluent limitations specified in Special Condition II.A, and is for essential maintenance to assure efficient operation, or unless the permittee can prove that:

- a. the bypass is unavoidable to prevent loss of life, personal injury, or substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources; and
- b. there are no feasible alternatives to the bypass; and
- c. the Department receives notification pursuant to General Condition III.B.1 above. Where the need for a bypass is known (or should have been known) in advance, this notification shall be submitted to the Department for approval at least ten days before the date of the bypass or at the earliest possible date if the period of advance knowledge is less than ten days; and
- d. the bypass is allowed under conditions approved by the Department to be necessary to minimize adverse effects.

6. Conditions Necessary for Demonstration of Upset

An upset shall constitute an affirmative defense to an action brought for noncompliance with technology-based effluent limitations only if the permittee demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence, that:

- a. an upset occurred and that the permittee can identify the specific cause(s) of the upset;

III. GENERAL CONDITIONS

- b. the permitted facility was at the time being operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures;
- c. the permittee submitted a 24-hour notification of upset in accordance with the reporting requirements of General Condition III.B.1 above;
- d. the permittee submitted, within five calendar days of becoming aware of the upset, documentation to support and justify the upset; and
- e. the permittee complied with any remedial measures required to minimize adverse impact.

In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

7. Sewage Sludge Requirements

The permittee shall comply with all State and federal laws and regulations regarding Sewage Sludge Management, and with any regulations promulgated pursuant to Environment Article, Section 9-230 et seq. or to the Clean Water Act, Section 405 (d). A Sewage Sludge Utilization Permit is required for the collection, handling, burning, storage, treatment, land application, disposal, or transportation of sewage sludge, processed sewage sludge, or any product containing these materials in Maryland. If the sludge is hauled out of the State for disposal, a transportation permit must be obtained from the Department.

8. Power Failure

The permittee shall maintain compliance with the effluent limitations and all other terms and conditions of this permit in the event of a reduction, loss or failure of the primary source of power to the wastewater collection and treatment facilities.

9. Right of Entry

In accordance with 40 CFR §122.41(i), the permittee shall allow the Secretary of the Department, the Regional Administrator of the Environmental Protection Agency, and their authorized representatives (including an authorized contractor acting as a representative), upon presentation of credentials and other documents as required by the law, to:

- a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

III. GENERAL CONDITIONS

- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
- d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

10. Property Rights/Compliance With Other Requirements

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property, invasion of personal rights, or any infringement of federal, State or local laws or regulations.

11. Reports and Information

- a. Upon request, the permittee shall provide to the Department, within a reasonable time, copies of records required to be kept by this permit. The permittee shall also furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit; or to determine compliance with this permit.
- b. All applications, reports or information submitted to the Department shall be signed and certified as required by COMAR 26.08.04.01 and 40 CFR 122.22.
- c. Except for data determined to be confidential under COMAR 26.08.04.01, all data shall be available for public inspection at the Department and the Office of the Regional Administrator of the Environmental Protection Agency. Effluent data shall not be considered confidential.
- d. Environment Article, Section 9-343 provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, shall upon conviction be punished by a fine of not more than \$10,000 or by imprisonment for not more than six months or by both.

III. GENERAL CONDITIONS

12. Transfer of Ownership or Control

In the event of any change in ownership or control of facilities from which the authorized discharge emanates, the permit may be transferred automatically to another person only if:

- a. the current permittee notify the Department, in writing, of the proposed transfer at least 30 days prior to the proposed transfer date;
- b. the notice includes a written agreement between the existing permittee and a new permittee containing the specific date of proposed transfer of permit coverage, and of responsibilities and liabilities under the permit; and
- c. neither the current permittee nor the new permittee receive notification from the Department, within 30 days of the Department's receipt of the agreement, of its intent to modify, revoke, reissue or terminate the existing permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph 12(b) above.

13. New Effluent Standards

This permit shall be revoked and reissued or modified to meet any effluent standard, water quality standard or prohibition established under the Environment Article, the Clean Water Act, or regulations promulgated thereto, and the permittee shall be so notified.

14. Industrial Users

The permittee shall require all industrial users of the wastewater treatment facility to comply with user charges as established by the permittee, pursuant to Section 9-326(a)(i) of the Environment Article.

15. Noncompliance

Nothing in this permit shall be construed to preclude the institution of any legal action for noncompliance with State, federal or local laws and regulations.

16. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action against the permittee or to relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Clean Water Act or under the Environment Article.

III. GENERAL CONDITIONS

17. Waterway Construction and Obstruction

The permit does not authorize the construction or placing of physical structures, facilities, debris, or the undertaking of related activities in any waters of this State including the 100 year flood plain.

18. Construction Permit

This permit is not a permit to construct. For a new facility, in order to make this permit valid, a construction permit shall be obtained to meet the requirements of COMAR 26.03.12.03(A) and Environment Article, Section 9-204(d).

19. Severability

If any provision of this permit shall be held invalid for any reason, the remaining provisions shall remain in full force and effect, and such invalid provisions shall be considered severed and deleted from this permit.

C. Wastewater Collection System

This permit shall not authorize discharges from the wastewater collection system for this facility.

1. Reporting Requirements

Pursuant to Environment Article Sub title 9-331.1, the permittee must report sanitary sewer overflows (SSOs) which result in the direct or potential discharge of raw or diluted sewage into the surface waters or ground waters of the State to the Water and Science Administration's Compliance Program. Concurrently, the permittee shall also notify the local health department. Such reports must be made via telephone as soon as practicable, but no later than 24 hours after the time that the permittee became aware of the event. Reportable SSOs include, but are not limited to, overflows into the surface of the ground, into waterways, storm drains, ditches or other manmade or natural drainage conveyances to surface or ground waters which are reasonably likely to reach waters of the State. Overflows that are wholly contained within buildings and not likely to discharge to waterways need not be reported. Treatment plant bypasses shall be reported under General Condition III.B.1. Telephone reports shall be made to (410) 537-3510 on weekdays between 8:00 a. m. and 5:00 p.m. After hours telephone notification shall be made to emergency response number at (866) 633-4686.

When the incident is reported to the Department, the following information needs to be included:

III. GENERAL CONDITIONS

- a. the location of the overflow, including city or county,
- b. the name of the receiving water, if applicable;
- c. an estimate of the volume of sewage discharged;
- d. a description of the sewer system or treatment plant component from which the overflow was released (such as manhole, crack in pipe, pumping station wet well or constructed overflow pipe);
- e. an estimate of the overflow's impact upon public health and to waters of the State;
- f. the cause or suspected cause of the overflow;
- g. the estimated date and time when the overflow began and stopped or the anticipated time the overflow is expected to continue;
- h. if known at the time of reporting, the steps taken or planned to reduce, eliminate and prevent reoccurrence of the overflow and a schedule of major milestones for those steps; (if unknown at the time the telephone report is made, the steps must be included in the written reports submitted under general conditions III.C.2).
- i. if known at the time of reporting, measures taken or planned to mitigate the adverse impact of the overflow and a schedule of major milestones for those steps (if unknown at the time the telephone report is made, the steps must be included in the written reports submitted under general conditions III.C.2); and
- j. whether there has already been a notification to the public and other City or County Agencies or Departments and how notification was done.

2. Written Reports

Within 5 calendar days following telephone notification of the event, the permittee shall provide MDE with a written report regarding the incident that includes, at a minimum, the information cited above.

The permittee shall maintain copies of all overflow records and reports, work orders associated with investigation of overflows, a list and description of complaints from customers or others related to overflows (including backups of sewage in to houses or businesses), and documentation of performance and implementation measures for minimum period of three years and shall make this information available to MDE for review upon written request.

III. GENERAL CONDITIONS

This wastewater collection system provision may be superseded by a general permit for collection systems, when such a permit is issued by MDE and the permittee have been accepted for registration under the permit.

3. Other Requirements

The permittee, as directed by the State or local health department, shall also be responsible for posting notification in close proximity to the affected area/stream and for conducting appropriate water quality sampling as deemed necessary.

D. Permit Expiration, Modification, or Revocation

1. Expiration of Permit

This permit and the authorization to discharge shall expire at midnight on the expiration date of the permit unless the permittee has submitted a timely and complete reapplication pursuant to Section II.I.

2. [Reserved.]

3. Permit Modification - Request of Responsible Permittee

A permit may be modified by the Department upon the written request of the permittee and after notice and opportunity for a public hearing in accordance with the provisions set forth in COMAR 26.08.04.10.

4. Permit Modification, Suspension, Revocation - Violation of Laws

A permit may also be modified, suspended or revoked by the Department, in the event of a violation of the terms or conditions of the permit, or of State or federal laws and regulations and in accordance with the provisions set forth in COMAR 26.08.04.10. This permit may be suspended or revoked upon a final, unreviewable determination that the permittee lacks, or is in violation of, any federal, state, or local approval necessary to conduct the activities authorized by this permit.

IV. CIVIL AND CRIMINAL PENALTIES

A. Civil Penalties for Violations of Permit Conditions

In addition to civil penalties for violations of State water pollution control laws set forth in Section 9-342 of the Environment Article, Annotated Code of Maryland, the Clean Water Act provides that any person who violates Section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act or in a permit issued under Section 404 of the Act, is subject to a civil penalty not to exceed \$37,500 per day for each violation.

B. Criminal Penalties for Violations of Permit Conditions

In addition to criminal penalties for violations of State water pollution control laws set forth in Section 9-343 of the Environment Article, Annotated Code of Maryland, the Clean Water Act provides that:

1. any person who negligently violates Section 301, 302, 306, 307, 308, 318, or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act, or in a permit issued under Section 404 of the Act, is subject to a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than one year, or by both.
2. any person who knowingly violates Section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act, or in a permit issued under Section 404 of the Act, is subject to a fine of not less than \$5,000 nor more than \$50,000 per day of violation, or by imprisonment for not more than three years, or by both.
3. any person who knowingly violates Section 301, 302, 306, 307, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act, or in a permit issued under Section 404 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, is subject to a fine of not more than \$250,000 or imprisonment of not more than 15 years, or both.
4. any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with or renders inaccurate any monitoring device or method required to be maintained under the Act, is subject to a fine of not more than \$10,000 or by imprisonment for not more than two years, or by both.

V. MAP SHOWING DISCHARGE POINT LOCATION



Millington Wastewater Treatment
Plant, Outfall 001A Location



0 2,450 4,900 Feet

Map Created June 9, 2017



Maryland
Department of
the Environment

Larry Hogan
Governor

Boyd Rutherford
Lieutenant Governor

Ben Crumles
Secretary

SUMMARY REPORT & FACT SHEET

Permit Application Numbers: State: 15-DP-0166 NPDES: MD0020435

Name of Facility: Millington Wastewater Treatment Plant (WWTP)

Mailing Address: P.O. Box 330
Millington, MD 21651

Facility's Location: 227 Sassafras Street
Millington, Queen Anne's County, MD 21651

Facility Organization: Town of Millington

Contact Person's Name: Elizabeth Jo Manning
-Title: Town Administrator
-Phone: 410-928-3880

Applicant engaged in: Treatment of Domestic Wastewater

Number of outfalls: 001A- (Facility Effluent) SIC Code: 4952

MDE Engineer: Elita Castleberry *SBC* Completion Date: 08/02/2017

Reviewed by:

Gurusharan C. Pancholi
Gurusharan C. Pancholi

08/07/2017

Date

Accepted by:

Yen-Der Cheng
Yen-Der Cheng, Chief
Municipal Surface Discharge Permits Division

8/8/17

Date

Is EPA joint review required?

Yes ☒, Date sent:

8/7/2017

No ☐

State/EPA comment/agreement received:

Yes ☒ Date received:

9/1/2017

N/A ☐

Table of Content

<u>NO.</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
I.	DESCRIPTION OF FACILITY, OUTFALL AND RECEIVING STREAM	3
	Facility Background and Description Wastewater Treatment Processes Outfall Details Receiving Stream Description and Properties Plant Performance Data	
II.	SPECIAL REQUIREMENTS & CONDITIONS	6
	85% Reduction Requirement for BOD ₅ and Total Suspended Solids Enhanced Nutrient Removal (ENR) Requirements TMDL Implementation Requirements Effluent Biototoxicity testing review for Whole Effluent Toxicity (WET) Toxic Substances Testing Review Wastewater Capacity Management Pretreatment Program/Influent Restrictions Reapplication Due Date Temperature Requirements WWTP use lagoon(s) for wastewater treatment Emergency holding pond requirement	
III.	PROPOSED EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS	12
	Proposed Effluent Limitations Proposed Monitoring Requirements Regulations, Rationale and Discussion Anti-backsliding Policy Review Anti-degradation Policy Review	
IV.	CHRONOLOGICAL LOG OF ACTIVITIES	22
V.	MAP SHOWING DISCHARGE POINT LOCATION	23
VI.	APPENDIX- A (Previous Effluent Limitations and Monitoring Requirements)	24

I. Description of Facility, Outfall and Receiving Stream**Description of Facility & Outfall(s)****Details for Facility:**POTW ☒ Privately Owned Facility ☐EPA MAJOR ☐ EPA MINOR ☒ Chesapeake Bay Significant ☐

Service Area Brief Description: The facility serves the town of Millington and surrounding communities. The WWTP also receives backwash from the Millington Water Treatment Plant (WTP).

Population Served: 970, 5-year projection flow: 0.105 Million Gallons per Day (MGD)

The proposed permitted flow of 0.105 MGD for the existing facility and future expansion to 0.14 MGD after appropriate upgrading and approval by MDE are consistent with the capacity listed in the approved 2011 Queen Anne's County Water and Sewer Plan (WSP) and the approved 2012 Kent County Comprehensive WSP, and both of which were approved by MDE's Water Resources Planning Program. They are also in conformance with the State's Smart Growth initiatives.

Current Design Capacity of the Facility: 0.10 MGD

Which of the following documents were used as the base of the design capacity?

- ☒ Construction Permit (Issued by MDE), ☒ Most updated W/S Plan (YEAR)
☒ Permit Application ☒ Other (Site Visit and as-built drawings)

Additional comments on the plant capacity: Based on as-built drawings from McCrone the current facility has a design capacity of 0.10 Million Gallons per Day (MGD), but with concurrence from the Engineering and Capital Projects Program the permitted flow of 0.105 was used in previous permit (07-DP-0166). The facility has requested a capacity upgrade to 0.140 MGD during the 07-DP-0166 permit application. The capacity upgrade was never performed and the permittee requested to incorporate the permitted flow of 0.105 in the 15-DP-0166 permit application.

Type of Discharge: ☒ Surface Discharge, Discharge Period: 12 months (January – December)
☐ Groundwater Discharge, Discharge Period: 12 months (January – December)

Additional comments on the discharge type: continuous discharge

Wastewater Treatment Processes: Manhole with manual bar screen (rake); pump station with two pumps and one backup pump; mechanical bar screen; Biolac system; clarifier (two circular); cloth disk filters; re-aeration chamber; UV lights for disinfection; and sampled before going to outfall. The Biolac system is an acronym for "Biological Wastewater Treatment System using Aeration Trains." It consists of a complete biological treatment system using floating diffusers on aeration chains to aerate and mix the wastewater in different sections of the basin. The settled sludge from the clarifiers is sent to digesters; digested sludge is placed in (four) drying beds and dried cake sent to Midshore landfill. The following chemicals are used at the facility: Lime is used to decrease pH and for alkalinity control and is added to Biolac system; Aluminum sulfate for solid settling and phosphorous removal is added at the end of the Biolac system; and Micro C as a carbon source is added at the influent pump station.

I. Description of Facility, Outfall and Receiving Stream

Water Treatment Plant Processes: Groundwater from 3 wells is treated by water softening (because of dissolved iron). The water softener consists of an ionic exchange. Water is chlorinated with sodium hypochlorite and sent to the water tower for storage. Only sodium hypochlorite is added to the water. The ionic exchange uses water from the tower to clean the resin. No additional chemicals are added to clean the resins. The WTP discharges backwash to the WWTP once/night. An estimated 57,960 gallons/quarter of backwash was sent from the WTP to the WWTP. This is less than 1% of the current average daily flow received by the WWTP.

Details for Outfall:

Outfall Type: Non-submerged discharge ☐
 Pipe ☐ Ditch ☐
 Distance from the last sampling point: _____
 Submerged Discharge: ☒
 Distance from the last sampling point: 350 feet, Diameter of the Outfall Pipe: 6 inch
 Distance from Shore: 4 feet, Depth: 2 feet (tidal dependent), No. of Diffusers: 1

Outfall Location:	GPS Readings		Maryland Coordinates (NAD27), feet	
	Latitude	Longitude	North	East
	39° 15' 26.69" (N)	75° 50' 22.1" (W)	520,716	1,128,621

Details for Effluent Receiving Stream

Name of Stream	Upper Chester River which flows into the Chesapeake Bay.
Type of Stream	Tidal Fresh
Stream Use Designation	Upper Chester River is designated as Use II (non-shellfish harvesting) water which is protected for estuarine and marine aquatic life. Chesapeake Bay is designated as Use II (shellfish harvesting) water which is protected for estuarine and marine aquatic life, and for shellfish harvesting.
River Mile	45.6 Miles (from outfall 001A to confluence of Upper Chester River to Chesapeake Bay.)
Watershed	8-Digit Sub-watershed: 02-13-05-10 Upper Chester River Chesapeake Bay Program Segment (CBPSEG): CHSTF (Upper Chester River Tidal Fresh)
Tier II Waters	Receiving stream(s) designated as Tier II water Yes ☐ No ☒ Tier II rules applicable to discharge Yes ☐ No ☐ N/A ☒

I. Description of Facility, Outfall and Receiving Stream

Does the facility discharge into impaired waters included on (303(d) list)?	Yes ☒ No ☐ As per the approved 2014 Integrated Report of Surface Water Quality (formerly known as the 303(d) List and 305(b) Report), the streams in the Upper Chester River sub-watershed (02-13-05-10) are listed as impaired water bodies due to: Total Suspended Solids, Total Phosphorous, Total Nitrogen, Enterococcus, and Mercury.			
Approved Total Maximum Daily Load (TMDL) / Water Quality Analysis (WQA) for concerned parameter(s)	Any approved TMDL(s) / WQA(s) for Upper Chester River Sub-watershed? Yes ☒ No ☐ A TMDL of Bacteria for Duck Neck Beach of Chester River Upper Chester River Basin Kent and Queen Anne's Counties Maryland was approved by the EPA on March 18, 2011 and includes the Millington WWTP. The Upper and Middle Chester River TMDL nutrients revised final document dated October 4, 2013. Is the Upper Chester River a part of the Chesapeake Bay TMDL (as accepted by EPA on 12/29/2010)? Yes ☒ No ☐ According to Maryland's Chesapeake Bay Tributary Strategy Statewide Implementation Plan, expanding non-significant facilities cannot exceed 6,100 lb/yr of TN and 457 lb/yr of TP.			
Background Stream Flows (See PROJECT FILE for details):	Period	7Q10 Low-flow, cfs	30Q5 Low-flow, cfs	Average Flow, cfs *
	5/1 To 10/31	13.462	28.089	N/A
	11/1 To 4/30	28.089	41.853	N/A
	Annual	13.289	25.802	N/A
	* Annual average flow applies to free-flowing streams.			

Plant Performance Evaluation:

Source of Data: USEPA's ICIS Database and Monthly Operating Reports (MORS),

Data Period: January 2012 to March 2017

The plant performance is summarized as follows:

Parameter	Concentration	Quantity
BOD ₅	5 mg/l	3 lbs/day
Total Suspended Solids (TSS)	3 mg/l	2 lbs/day

I. Description of Facility, Outfall and Receiving Stream

Parameter	Concentration	Quantity
Total Ammonia Nitrogen as N (5/1 to 10/31) (11/1 to 4/30)	6.8 mg/l 4.5 mg/l	3.6 lbs/day 2.8 lbs/day
Organic Nitrogen as N	0.7 mg/l	0.4 lbs/day
(Nitrite + Nitrate) as N	4.7 mg/l	2.8 lbs/day
Total Nitrogen as N	10.8 mg/l	191.9 lbs/day 1943 lbs/year
Orthophosphate as P	0.2 mg/l	0.1 lbs/day
Total Phosphorus as P	0.5 mg/l	8.3 lbs/day 428 lbs/year
E. Coli	24 MPN/100ml	N/A
pH	7.1 minimum 8.0 maximum	N/A N/A
Dissolved Oxygen (DO)	6.9 mg/l	N/A
Flow	N/A	0.071 MGD

II. Special Requirements and Conditions

WWTP meeting at least 85% reduction of BOD₅ and TSS Yes ☒ No ☐ N/A ☐

Based on the plant performance records for 1/2012 to 3/2017, the effluent BOD₅ and TSS are averaged 5 mg/l and 3 mg/l, respectively. Using BOD₅ and TSS concentration of 200 mg/l for typical raw-sewage influent (as stated in the technical manuals), this facility removes more than 97% of BOD₅ and 98% TSS during the treatment processes, far exceeding the minimum 85% removal requirement for POTWs with the secondary treatment.

Rationale: 40CFR, PART 133, §133.102

Enhanced Nutrient Removal (ENR) Requirements: ENR Limits ☒ ENR Goal ☐ N/A ☐

According to Maryland's Chesapeake Bay Tributary Strategy Statewide Implementation Plan, expanding non-significant facilities cannot exceed 6,100 lb/yr of TN and 457 lb/yr of TP. Due to the request for an increase in flow in the 07-DP-0166 permit, other nutrient TMDLs and being a non-significant WWTP, the applied TN and TP limits for the permit renewal are 3,344 lb/yr and 457 lb/yr, respectively.

Rationale: Maryland's Chesapeake Bay Tributary Strategy Statewide Implementation Plan, 2008 and Chesapeake Bay Watershed Implementation Plan

TMDL Implementation Requirements: Yes ☒ No ☐ N/A ☐

The Bacteria Waste Load Allocation (WLA) for the Millington WWTP included in the TMDL for Duck Neck Beach of Chester River in the Upper Chester River Basin Kent and Queen Anne's Counties Maryland was approved by the EPA on March 18, 2011 TMDL for the permitted flow of 0.140 MGD with fecal coliform limit of 200 MPN/100 ml monthly log mean. The corresponding Enterococci concentration estimate based on the regression equation is 57 MPN/100 ml monthly log mean and the permitted Enterococci load is 3.02E+08 MPN/day for a flow of 0.140 MGD. As the Duck Neck Beach Area of the Upper Chester River is designated as Use II (non-shellfish harvesting) water protected for marine and aquatic life, the bacterial water quality criteria is established as 35 MPN/100ml log mean. The effluent limitation for E. coli at 126 MPN/100 ml was set equal to the receiving stream standards for discharges to Use II water (tidal fresh) which was incorporated to establish E. coli limit in the previous discharge permit (07-DP-1066).

The E. coli limit shall be applicable until the Enterococci limit goes into effect. The Enterococci limit shall go into effect after a period of one year from the effective date of the permit. Since the facility has requested an increase in flow of 0.140 MGD and the TMDL is based on a flow rate of 0.140 MGD the Enterococci limit will be set at 57 MPN/100 ml for both the current and increase in flow.

The TN and TP WLA for the Millington WWTP included in the Upper and Middle Chester River TMDL nutrients revised final document dated October 4, 2013 has TN and TP annual limits for 0.105 MGD of 5,744 lb/yr and 957 lb/yr; respectively. The growing season limits from May 1 to October 31 for 0.105 MGD are 2,896 lb/season for TN and 483 lb/season for TP. According to Maryland's Chesapeake Bay Tributary Strategy Statewide Implementation Plan, expanding non-significant facilities cannot exceed 6,100 lb/yr of TN and 457 lb/yr of TP. Due to the request for an increase in flow and being a non-significant WWTP, the applied TN and TP limits for the permit renewal are 3,344 lb/yr and 457 lb/yr, respectively.

II. Special Requirements and Conditions

Rationale: 40 CFR §130.7, The approved bacteria TMDL(s) for Duck Neck Beach of Chester River in Upper Chester River Basin and nutrient TMDL for Upper and Middle Chester River in Chester River Basin.

Was Whole Effluent Toxicity (WET) testing required in the previous discharge permit (07-DP-0166)?

Yes ☐ No ☒ N/A ☐

Is WET testing proposed for the permit?

Yes ☐ No ☒ N/A ☐

Estimation of Instream Waste Concentration (IWC) for WET:

A. For Discharge to Freshwater:

$$IWC(\%) = \left[\frac{Q_D \times 1.5472}{(Q_D \times 1.5472) + Q_{RW}} \right] \times 100 = \left[\frac{0.105 \times 1.5472}{(0.105 \times 1.5472) + 25.802} \right] \times 100 = \underline{0.625\%}$$

Where, Q_D = Plant permitted flow = 0.105, MGD

Q_{RW} = Receiving Water annual 30Q5 low-flow = 25.414, cfs

At an increased flow rate of 0.140 MGD the IWC% = 0.832%

Are WET limits proposed?

Yes ☐ No ☒ N/A ☐

Rationale: COMAR 26.08.03.07D(1,) COMAR 26.08.03.07E and MDE's "Effluent Biototoxicity Testing Protocol, revised on 12/14/2012".

Was Toxic Chemical Testing required in the previous discharge permit (07-DP-0166)?

Yes ☐ No ☒ N/A ☐

As the Millington WWTP is a minor POTW and has no potential of toxic effluent, the previous permit (07-DP-0166) did not require the permittee to perform WET testing. No reasonable potential evaluation of the facility's potential to violate in-stream toxic substance criteria was made since toxic substance data for the facility is not available. No priority pollutant testing is recommended for the renewal discharge permit. Standard influent restriction requirements for a non-pretreatment minor POTW are proposed for the renewal discharge permit.

Is Toxic Chemical Testing (TCT) proposed?

Yes ☐ No ☒ N/A ☐

Rationale: COMAR 26.08.03.07D(1) and MDE's "Toxic Pollutant Analytical and Reporting Requirements Protocol, revised on 5/18/2011"

Pretreatment Program/Influent Restriction

WWTP with approved pretreatment program ☐

Non-pretreatment program WWTP ☒

Does the non-pretreatment WWTP require the influent restriction?

Yes ☒ No ☐

Rationale: COMAR 26.08.08 and Department Guidelines

II. Special Requirements and Conditions

Wastewater Capacity Management

Does the proposed permit include condition pertaining to the wastewater flow capacity management?

Yes ☒ No ☐

If Yes, does the proposed permit require submittal of Capacity Management Plan (CMP)?

Yes ☐ No ☒

Because the most recent three-year annual average wastewater flow is 73% of the existing rated capacity of 0.105 MGD which does not exceed a threshold of 80 % capacity.

Rationale: MDE's Guidance Document "Wastewater Capacity Management Plans, 2006"

Reapplication Due Date for Next Permit Renewal

Per the Departmental guidelines for the watershed permitting, the next renewal of a discharge permit for the Millington WWTP is scheduled for 2nd quarter, 2nd year in cycle with the projected application received date of 04/01/2020 and reissuance date of 07/01/2021.

The issuance date of this proposed permit will be established after fulfilling all the formalities of the public participation process. It is anticipated that a period between the proposed permit issuance date and the above stated reapplication date for the next permit cycle year would likely to be less than three years. As per the USEPA's guideline for NPDES discharge permits, it is suggested that the facility's performance results for at least three year period should be considered for the next permit renewal processing; and therefore, the reapplication due date for the proposed discharge permit will be set as no later than 12 months before the expiration date of the proposed permit.

Rationale: COMAR 26.08.04.01 and Departmental Guidelines.

Are temperature requirements included?

Yes ☐ No ☒

The Department recognizes that the WWTP effluent may involve a thermal component. For this discharge, there is no reasonable potential for the temperature to exceed the 90° F or the ambient temperature of the surface waters criteria in COMAR 26.08.02.03-3; therefore, temperature limitations and monitoring are not required.

Rationale: COMAR 26.08.02.03-3C(3) & COMAR 26.08.02.03-3A(3)

Does the WWTP use lagoon(s) for wastewater treatment?

Yes ☐ No ☒

Rationale: Department Policy.

Is the emergency holding pond required?

Yes ☐ No ☒

Rationale: COMAR 26.08.04.04C(2)(c)

III. Proposed Effluent Limits and Monitoring Requirements

The effluent limits and monitoring requirements, as listed below, are proposed to process the application for the discharge permit renewal. ***Refer to Appendix- A for the previous permit's effluent limitations and monitoring requirements.***

The quality of the effluent discharged by the facility at the discharge location- 001A^{(1) (2) (3) (4)} shall be limited and/or monitored at all times as shown below. If the sampling point is other than the outfall- 001A, the permittee shall ensure that the effluent samples are representative of the effluent quality being discharged at the outfall 001A.

(a) For Existing Facility with Design Capacity of 0.105 MGD:

Effluent Characteristics	Requirements	Period	Quantity	Concentration	Footnotes
BOD ₅	Limits	All Year	26 lbs/d (mo ave) 39 lbs/d (wkly ave)	30 mg/l (mo ave) 45 mg/l (wkly ave)	N/A
	Monitoring	All Year	Frequency One per week	Sample Type 24-hour composite	(9)
Total Suspended Solids (TSS)	Limits	All Year	26 lbs/d (mo ave) 39 lbs/d (wkly ave)	30 mg/l (mo ave) 45 mg/l (wkly ave)	N/A
	Monitoring	All Year	Frequency One per week	Sample Type 24-hour composite	(9)
Total Ammonia Nitrogen as N (Monitoring only parameter)	Reporting	All Year	N/A	REPORT mg/l (mo ave)	
	Monitoring	All Year	Frequency One per week	Sample Type 24-hour composite	(9)(10)(11)
Organic Nitrogen as N (Monitoring only parameter)	Reporting	All Year	N/A	REPORT mg/l (mo ave)	(9)(10)(11)
	Monitoring		Frequency One per week	Sample Type 24-hour composite	
(Nitrite + Nitrate) as N (Monitoring only parameter)	Reporting	All Year	N/A	REPORT mg/l (mo ave)	(9)(10)(11)
	Monitoring		Frequency One per week	Sample Type 24-hour composite	
Total Nitrogen as N	Limits	All Year	REPORT lbs/mo (mo load) 5,744 lbs/yr (annual max)	REPORT mg/l (mo ave)	(4)(5)(6)
		5/1 to 10/31	2,896 lbs/season (seasonal load)		(4)(5)(6)
	Monitoring	All Year	Frequency One per week	Sample Type Calculated	(9)(10)(11)(12)
Orthophosphate as P (Monitoring only parameter)	Reporting	All Year	N/A	REPORT mg/l (mo ave)	(9)(10)
	Monitoring		Frequency One per month	Sample Type 24-hour composite	

III. Proposed Effluent Limits and Monitoring Requirements

Effluent Characteristics	Requirements	Period	Quantity	Concentration	Footnotes
Total Phosphorus as P	Limits	All Year	REPORT lbs/mo (mo Load) 957 lbs/yr (annual max)	REPORT mg/l (mo ave)	(4)(5)(6)
		5/1 to 10/31	483 lbs/season (seasonal load)		(4)(5)(6)
	Monitoring	All Year	Frequency One per week	Sample Type 24-hour composite	(9)(10)(12)
E. Coli	Limits	All Year	N/A	126 MPN/100 ml (max mo geo mean)	(8)
	Monitoring	All Year	Frequency One per week	Sample Type Grab	(9)(17)
Enterococci	Limits	All Year	N/A	57 MPN/100 ml (max mo geo mean)	(8)
	Monitoring	All Year	Frequency One per week	Sample Type Grab	(9)(17)
Total Residual Chlorine (TRC)	Limits	All Year	N/A	(See footnote- 7)	(7)
	Monitoring	All Year	Frequency One per day	Sample Type Grab	(9)(13)
pH	Limits	All Year	N/A	6.5 SU min 8.5 SU max	
	Monitoring	All Year	Frequency One per day	Sample Type Grab	(9)
Dissolved Oxygen (DO)	Limits	All Year	N/A N/A	5.0 mg/l (min at anytime) 5.5 mg/l (min mo ave)	N/A
		2/1 – 5/31	N/A	6.0 mg/l (min wkly ave)	
	Monitoring	All Year	Frequency One per day	Sample Type Grab	(9)
Flow	Reporting	All Year	REPORT mgd (mo ave) REPORT mgd (daily max)	N/A	N/A
	Monitoring	All Year	Frequency Continuous	Sample Type Recorded	(9)(14)(15)
Total Flow	Reporting	All Year	REPORT Mgal/mo (Monthly Total)	N/A	(9)(16)
	Monitoring	All Year	Frequency One per month	Sample Type Calculated	

An annual average flow of 0.105 million gallons per day (mgd) was used in waste allocation calculations (expressed as waste loading rate limit), and this unit shall be used when reporting on the Discharge Monitoring Report (DMR) as per the General Condition III.A.2 of the discharge permit. Notification is to be provided to the Department at least 180 days before the annual average flow is expected to exceed this flow level. If a permit modification is required, the Department will initiate the public participation NPDES process.

III. Proposed Effluent Limits and Monitoring Requirements

(b) For Expanded Facility with the Design Capacity of 0.140 MGD:

The limitations on this page shall be applicable after the appropriate upgrades and expansion of the facility to provide a design capacity of at least 0.140 MGD is completed and becomes operational. The permittee shall notify the MDE's Compliance Program at least 30 days in advance of the commencement date of the newly expanded facility starts discharging through outfall -001A.

The quality of the effluent discharged by the facility at the discharge location- 001A^{(1) (2) (3) (4)} shall be limited and/or monitored at all times as shown below. If the sampling point is other than the outfall- 001A, the permittee shall ensure that the effluent samples are representative of the effluent quality being discharged at the outfall 001A.

Effluent Characteristics	Requirements	Period	Quantity	Concentration	Footnotes
BOD₅	Limits	All Year	26 lbs/d (mo ave) 39 lbs/d (wkly ave)	23 mg/l (mo ave) 34 mg/l (wkly ave)	N/A
	Monitoring	All Year	Frequency One per week	Sample Type 24-hour composite	(9)
Total Suspended Solids (TSS)	Limits	All Year	26 lbs/d (mo ave) 39 lbs/d (wkly ave)	23 mg/l (mo ave) 34 mg/l (wkly ave)	N/A
	Monitoring	All Year	Frequency One per week	Sample Type 24-hour composite	(9)
Total Ammonia Nitrogen as N (Monitoring only parameter)	Reporting	All Year	N/A	REPORT mg/l (mo ave)	
	Monitoring	All Year	Frequency One per week	Sample Type 24-hour composite	(9)(10)(11)
Organic Nitrogen as N (Monitoring only parameter)	Reporting	All Year	N/A	REPORT mg/l (mo ave)	(9)(10)(11)
	Monitoring		Frequency One per week	Sample Type 24-hour composite	
(Nitrite + Nitrate) as N (Monitoring only parameter)	Reporting	All Year	N/A	REPORT mg/l (mo ave)	(9)(10)(11)
	Monitoring		Frequency One per week	Sample Type 24-hour composite	
Total Nitrogen as N	Limits	All Year	REPORT lbs/mo (mo load) 3,344 lbs/yr (annual max)	REPORT mg/l (mo ave)	(4)(5)(6)
	Monitoring	All Year	Frequency One per week	Sample Type Calculated	(9)(10)(11)(12)
Orthophosphate as P (Monitoring only parameter)	Reporting	All Year	N/A	REPORT mg/l (mo ave)	(9)(10)
	Monitoring		Frequency One per month	Sample Type 24-hour composite	

III. Proposed Effluent Limits and Monitoring Requirements

Effluent Characteristics	Requirements	Period	Quantity	Concentration	Footnotes
Total Phosphorus as P	Limits	All Year	REPORT lbs/mo (mo Load) 457 lbs/yr (annual max)	REPORT mg/l (mo ave)	(4)(5)(6)
	Monitoring	All Year	Frequency One per week	Sample Type 24-hour composite	(9)(10)(12)
E. Coli	Limits	All Year	N/A	126 MPN/100 ml (max mo geo mean)	(8)
	Monitoring	All Year	Frequency One per week	Sample Type Grab	(9)(17)
Enterococci	Limits	All Year	N/A	57 MPN/100 ml (max mo geo mean)	(8)
	Monitoring	All Year	Frequency One per week	Sample Type Grab	(9)(17)
Total Residual Chlorine (TRC)	Limits	All Year	N/A	(See footnote- 7)	(7)
	Monitoring	All Year	Frequency One per day	Sample Type Grab	(9)(13)
pH	Limits	All Year	N/A	6.5 SU min 8.5 SU max	
	Monitoring	All Year	Frequency One per day	Sample Type Grab	(9)
Dissolved Oxygen (DO)	Limits	All Year	N/A N/A	5.0 mg/l (min at anytime) 5.5 mg/l (min mo ave)	N/A
		2/1 – 5/31	N/A	6.0 mg/l (min wkly ave)	
	Monitoring	All Year	Frequency One per day	Sample Type Grab	(9)
Flow	Reporting	All Year	REPORT mgd (mo ave) REPORT mgd (daily max)	N/A	N/A
	Monitoring	All Year	Frequency Continuous	Sample Type Recorded	(9)(14)(15)
Total Flow	Reporting	All Year	REPORT Mgal/mo (Monthly Total)	N/A	(9)(16)
	Monitoring	All Year	Frequency One per month	Sample Type Calculated	

An annual average flow of 0.140 million gallons per day (mgd) was used in waste allocation calculations (expressed as waste loading rate limit), and this unit shall be used when reporting on the Discharge Monitoring Report (DMR) as per the General Condition III.A.2 of the discharge permit. Notification is to be provided to the Department at least 180 days before the annual average flow is expected to exceed this flow level. If a permit modification is required, the Department will initiate the public participation NPDES process.

III. Proposed Effluent Limits and Monitoring Requirements

Footnotes:

For Effluent Limitations

(1) When this permit is renewed, the new limitations may not be equal to the above limitations.

(2) There shall be no discharge of floating solids or visible foam other than trace amounts.

(3) The permit may also be reopened in accordance with the requirements of MDE's Watershed Permitting Plan under which all discharge permits in a watershed are issued the same year.

(4) The Upper Chester River is on the 303(d) list as the impaired waters for: Total Suspended Solids, Total Phosphorous, Total Nitrogen, Enterococcus and Mercury.

A Total Maximum Daily Load (TMDL), approved by the EPA on 3/18/2011, allocated a E. coli limits of 200 MPN/100ml monthly log mean and the corresponding Enterococci concentration estimate based on the regression equation is 57 MPN/100 ml monthly log mean to this facility; effluent limitation for E. coli at 126 MPN/100 ml was set equal to the receiving stream standards for discharges to Use II water, the E. coli limit is in conformance with the TMDL. The E. coli limit shall be applicable until the Enterococci limit goes into effect. The Enterococci limit shall go into effect after a period of one year from the effective date of the permit.

A TMDL, revised final document approved by the EPA on 10/4/2013, allocated a Total Nitrogen (TN) and Total Phosphorous (TP) annual limits of 5,744 lb/yr and 957 lb/yr and growing season (May 1 to October 31) limits of 2,896 lb/season and 483 lb/season for a flow of 0.105 MGD. The TN and TP limits are in conformance with this TMDL.

This permit is in conformance with the “**Chesapeake Bay TMDL for Nitrogen, Phosphorus and Sediment**” established on December 29, 2010 and with Maryland’s Chesapeake Bay Tributary Strategy Statewide Implementation Plan dated January 24, 2008.

When TMDLs for other remaining parameters are completed, limits may be imposed, after the public participation process, to incorporate any TMDL requirements.

(5) Under the Maryland Chesapeake Bay Tributary Strategy Statewide Implementation Plan for expanding non-significant facilities, the Millington WWTP has been assigned the Annual Maximum nutrient loads of 3,344 lbs/year for total nitrogen (TN) and 457 lbs/year for total phosphorus (TP), and they have been incorporated as limitations upon the capacity expansion to increase flow from 0.105 MGD to 0.140 MGD. The permittee shall make every effort to optimize the operation of the existing WWTP to meet the TN and TP loading rate limits.

The first exceedance of the permit limit shall be counted and reported as daily exceedances beginning from the first exceedance, determined to the nearest day, through December 31. In addition, after any such exceedance, the permittee shall demonstrate to the Department's satisfaction that the facility is optimizing its nutrient removal capability, and neither the arrival of the next calendar year nor the issuance of a permit renewal during a period of noncompliance shall obviate continuance of any noncompliance status related to treatment optimization requirements.

(6) The permittee may request that the permit be reopened and modified to include nutrient trading consistent with all applicable regulations and requirements in effect at that time.

(7) Total residual chlorine limitation of *the nondetectable level* shall be applicable, when chlorine or any chlorine-containing compound is used in any treatment process(es), including but not limited to disinfection,

III. Proposed Effluent Limits and Monitoring Requirements

that could become a potential constituent of the effluent discharged from the Millington WWTP. The wastewater shall be dechlorinated to reduce effluent total residual chlorine concentration to the nondetectable level (See definition I.M of the discharge permit).

- (8) E.coli limit of 126 MPN/100 ml shall be applicable until the Enterococci limit goes into effect. The Enterococci limit shall go into effect after a period of one year from the effective date of the permit.

For Monitoring Requirements

- (9) "STORET" (short for STORage and RETrieval) is a widely-used repository for water quality data reporting and monitoring. The corresponding STORET codes for the effluent characteristics specified in Special Conditions II.A and II.B are: BOD₅ (00310), Total Suspended Solids (00530), Total Ammonia Nitrogen as N (00610), Total Phosphorus as P (00665), Total Nitrogen as N (00600), (Nitrite + Nitrate) as N (00630), Organic Nitrogen as N (00605), Orthophosphate as P (04175), E. Coli (51040), Enterococci (61211), Total Residual Chlorine (50060), Dissolved Oxygen (00300), pH (00400), Flow (50050), and Total monthly flow (82220).
- (10) This parameter (without effluent limitations) must be monitored, and it shall be reported on the Monthly Operating Report (MOR) as individual results and on the Discharge Monitoring Report as monthly average concentrations.
- (11) Total nitrogen as N (in mg/l) is a calculated parameter as the sum of individual results for total ammonia nitrogen as N, organic nitrogen as N and (nitrite + nitrate) as N. All the nitrogen species must be sampled on the same day.
- (12) The permittee shall also calculate and report on the monthly DMR the TN and TP total monthly loads plus year-to-date cumulative loads for the calendar year in question for the outfall- 001A.
- For each calendar year, the year-to-date cumulative loads of TN and TP for the month of December shall represent the total annual loads, and they must be incorporated toward complying with the respective annual maximum load limits. The cumulative loads for the growing season (May 1 to October 31) shall be reported on the corresponding monthly DMRs to comply with the growing season loading rate limits.
- (13) The Minimum monitoring requirements of one per day-grab samplings for total residual chlorine shall be applicable, when chlorine or any chlorine compound is used in any treatment process(es), including but not limited to disinfection, that could become a potential constituent of the effluent discharged from the Millington WWTP. The minimum detection level (quantification level) for total residual chlorine is 0.10 mg/l. The permittee may report all results below the minimum level as <0.10 mg/l. All results reported below the minimum level shall be considered in compliance.
- (14) Flows shall be reported in millions gallons per day (mgd) to at least the nearest 1,000 gallons per day. (Example: A flow of 524,699 gallons per day shall be reported as 0.525 mgd.). For each calendar month, flows shall be reported on the MOR as daily individual results and on the DMR as monthly average (mgd) and daily maximum (mgd)).
- (15) Continuous electronic flow measurement and recording which can produce a permanent record are acceptable to the Department.
- (16) Total monthly flow is a calculated parameter equal to sum of the daily flow results in a calendar month. It shall be reported on the monthly DMR as Total monthly flow in millions gallons (MG) to at least the nearest 1,000 gallons. (Example: A flow of 1,524,699 gallons shall be reported as 1.525 MG).
- (17) E.coli monitoring shall be conducted until the Enterococci limit becomes effective, at that time, E. coli monitoring will cease and Enterococci monitoring shall be conducted.

III. Proposed Effluent Limits and Monitoring Requirements

<i>Regulations and Rationale for Effluent Limitations:</i>	
BOD₅	<u>Regulations:</u> COMAR 26.08.02.03-3C(8), COMAR 26.08.04.04C(1) and COMAR 26.08.01.01B(80). <u>Discussion and Rationale(s):</u> In 1989 and 2017 background pollutant concentrations from surrounding water quality stations were used to calculate and compare the background water quality of the receiving stream to the effluent load of the WWTP. The flow used in 1989 was 0.07 MGD while the flow used in 2017 was 0.14 MGD. Secondary treatment standard limits were applied in 1989 and applied to the previous permits 07-DP-0166 at a flow of 0.105 MGD and have been adjusted with the increase in flow and have been considered at this time for the proposed permit renewal. These limits will be protective of meeting the dissolved oxygen criteria in downstream portion of the effluent receiving stream(s).
Total Suspended Solids (TSS)	<u>Regulations:</u> COMAR 26.08.02.03-3C(5), COMAR 26.08.02.03-3A(5), COMAR 26.08.04.04C(1), COMAR 26.08.01.01B(80) and 40 CFR§133.102 - §133.105. <u>Discussion and Rationale(s):</u> The Chesapeake Bay TMDL (Phase I) approved by USEPA on 12/29/2010 allocated the aggregate annual TSS waste load to cover all non-significant point sources which are located into the Chesapeake Bay Water Quality Segment-Upper Chester River Tidal Fresh (CHSTF), rather than individual sources. Secondary treatment standard limits of 30 mg/l monthly average is in conformance to the Bay TMDL were applied in 1989 and applied to the previous permits 07-DP-0166 at a flow of 0.105 MGD and have been adjusted with the increase in flow and have been considered at this time for the proposed permit renewal.
Total Ammonia Nitrogen as N	<u>Regulations:</u> COMAR 26.08.02.03-2H & COMAR 26.08.02.03-2I, and COMAR 26.08.02.05C, COMAR 26.08.02.05D. <u>Discussion and Rationale(s):</u> The reasonable potential of the Millington WWTP effluent to cause a violation of the receiving stream's ammonia water quality criteria was investigated to process the discharge permit renewal. An in-house SPREADSHEET program (developed by the Municipal Surface Discharge Permits Division) was used as a tool for the toxicity analysis. The dilution factors, based on the applicable mixing zone criteria, were incorporated in the analysis. As the ammonia toxicity criteria are pH dependent, the effluent pH of 7.9 and 8.0 for winter and summer, respectively, which is a median of the maximum effluent pH data from 1/2013 to 3/2017, determined there ammonia concentrations from the WWTP effluent could be high values due to the high dilutions in the Chester River. Therefore no ammonia limits are imposed at this time for the proposed permit renewal.
Total Nitrogen as N	<u>Regulations:</u> 40 CFR §130.7, COMAR 26.08.02.04, COMAR 26.08.03.01C(3), COMAR 26.08.04.04C, and in addition, the Chesapeake Bay Nutrient Reduction Strategy, Maryland's Chesapeake Bay Tributary Strategy Statewide Implementation Plan and the Enhanced Nutrient Removal (ENR) Policy. <u>Discussion and Rationale(s):</u> Refer to Section II (Special Requirements and Conditions) on page 7 for ENR load goal requirements.
Total Phosphorus as P	<u>Regulations:</u> 40 CFR §130.7, COMAR 26.08.02.04, COMAR 26.08.03.01C(3), COMAR 26.08.04.04C, and in addition, the Chesapeake Bay Nutrient Reduction Strategy and the Enhanced Nutrient Removal (ENR) Policy. <u>Discussion and Rationale(s):</u> Refer to Section II (Special Requirements and Conditions) on page 7 for ENR load goal requirements.

III. Proposed Effluent Limits and Monitoring Requirements

<i>Regulations and Rationale for Effluent Limitations:</i>	
E. Coli	<u>Regulations:</u> COMAR 26.08.02.03-3C(1) and COMAR 26.08.02.03-3A(1). <u>Discussion and Rationale(s):</u> The E. Coli limits were established in the previous permit (07-DP-0166) based on water quality criteria for Use II (non-shellfish harvesting) tidal freshwater.
Enterococci	<u>Regulations:</u> 40 CFR §130.7, COMAR 26.08.02.03-3C(1) and COMAR 26.08.02.03-3A(1) <u>Discussion and Rationale(s):</u> A TMDL of Bacteria for Duck Neck Beach of Chester River in the Upper Chester River Basin Kent and Queen Anne's Counties Maryland was approved by the EPA on March 18, 2011 and includes the Millington WWTP. The TMDL are based on the Millington WWTP permitted flow of 0.140 MGD with fecal coliform limit of 200 MPN/100 ml monthly log mean and the corresponding Enterococci concentration estimated based on the regression equation is 57 MPN/100 ml monthly log mean and the permitted Enterococci load is 3.02E+08 MPN/day. The effluent limitation for E. coli at 126 MPN/100 ml was set equal to the receiving stream standards for discharges to Use II water (tidal fresh) and is in conformance with the fecal coliform TMDL. (There is also a non-marine water Enterococci limit for the receiving stream which is more stringent than the TMDL). The E. coli limit shall be applicable until the Enterococci limit goes into effect. The Enterococci limit shall go into effect after a period of one year from the effective date of the permit. Since the facility has requested an increase in flow of 0.140 MGD and the TMDL is based on a flow rate of 0.140 MGD the limit will be set at 57 MPN/100 ml for both the current and increase in flow.
Total Residual Chlorine	<u>Regulations:</u> COMAR. 26.08.02.03-2G(1), COMAR 26.08.02.05C, COMAR 26.08.02.05D, COMAR 26.08.03.06C(5), COMAR 26.08.03.06D, COMAR 26.08.03.06F <u>Discussion and Rationale(s):</u> The reasonable potential of the Millington WWTP effluent to cause a violation of the receiving stream's TRC water quality criteria was investigated to process the discharge permit renewal. An in-house SPREADSHEET program (developed by the Municipal Surface Discharge Permits Division) is used as a tool for the toxicity analysis. The toxicity based limit was compared with the effluent quality criteria to set the TRC limit requirement.
pH	<u>Regulations:</u> COMAR 26.08.02.03-3C(4) and COMAR 26.08.02.03-3A(4). <u>Discussion and Rationale(s):</u> The limits are set equal to the stream water quality criteria.
Dissolved Oxygen (DO)	<u>Regulations:</u> 26.08.02.03-3C(8) and COMAR 26.08.02.08 <u>Discussion and Rationale(s):</u> The 5.0 mg/l minimum at anytime (1/1 to 12/31) is based on the criteria for class II waters based on support of estuarine and marine aquatic life and shellfish harvesting bacterial criteria is the same as the class I criteria. The 6.0 mg/l for a 7-day average (2/1 to 5/31) is based on dissolved oxygen criteria for class II waters seasonal and migratory fish spawning and nursery subcategory. The dissolved oxygen concentration in areas designated as migratory spawning and nursery seasonal use. The 5.5 mg/l for a 30-day average (1/1 to 12/31) is based on dissolved oxygen criteria for class II waters the seasonal shallow-water submerged aquatic vegetation subcategory is the same as for the open-water fish and shellfish subcategory year-round in tidal waters of salinity less than or equal to 0.5 parts per thousand. Also, refer to Discussion and Additional Rationale for BOD₅.

III. Proposed Effluent Limits and Monitoring Requirements

<i>Regulations and Rationale for Effluent Limitations:</i>	
Flow	<u>Regulations:</u> COMAR 26.08.04.02A(2). The discharge is consistent with the Kent County and Queen Anne's County water and sewer master plan. <u>Discussion and Rationale(s):</u> The permit flow considered for this permit renewal is equivalent to the rated design capacity of the facility. It is not a limitation, but it is incorporated with concentration limits to calculate the waste load limits for: BOD₅, TSS, TP and TN.
<i>Additional Rationales for Effluent Limitations:</i>	
(A) Anti-backsliding Policy Review: Provisions as stipulated in Federal Regulations [CWA §303(d)(4), CWA §402(o) & 40 CFR 122.44(l) require a reissued permit to be as stringent as the previous permit requirements, with some exceptions as determined by the Department. The effluent limitations established for the permit renewal are in conformance to the above stated provisions.	
(B) Anti-Degradation Policy Review: Waters of this State shall be protected and maintained for existing uses and the basic uses of water contact recreation, fishing, protection of aquatic life and wildlife, and agricultural and industrial water supply as identified in Use I. The discharge permit being processed includes sufficient limits in order to maintain and protect water quality intended for the existing designated uses.	
<i>Rationale(s) for Monitoring Requirements:</i>	
The Department Guidelines for Minimum Monitoring Requirements as revised by memorandums of 7/24/1996 and 3/6/2008.	

IV. Chronological Log of Activities:

DATE	ACTIVITY DESCRIPTION
01/07/2015	The Permitting and Customer Services (PCS) received discharge permit renewal application dated 12/30/2014 completed by Elizabeth Jo Manning, Town Administrator.
11/30/2015 and 12/1/2015	Letters to Mr. Jay Janney (MES), Elizabeth Jo Manning (Town Administrator), Mr. Ronald Maranto, and Mr. John Nickerson (Queen Anne's Co. Health Dept.) to notify them publication of Notice of Application on 12/11/2015 and 12/18/2015 in the newspaper "The Record Observer."
06/01/2017	Report narrating information gathered during the site visit of Millington WWTP along with photographs.

V. MAP SHOWING POINT OF DISCHARGE LOCATION



Millington Wastewater Treatment
Plant, Outfall 001A Location



0 2,450 4,900 Feet

Map Created June 9, 2017

VI. APPENDIX- A**Effluent Limitations and Monitoring Requirements of the Previous Permit (07-DP-0166)****A.1 Effluent Limitations, Outfall 001 ^{(1) (2) (3)}**

The quality of the effluent discharged by the facility through an outfall at the discharge point- 001 shall be limited at all times as shown below:

<i>Maximum Effluent Limitations</i>						
<u>Effluent Characteristics</u>	<i>Monthly Average Loading Rate, Pounds/day</i>	<i>Weekly Average Loading Rate, Pounds/day</i>	<i>Daily Average Loading Rate, Pounds/day</i>	<i>Monthly Average Concentration, mg/l</i>	<i>Weekly Average Concentration, mg/l</i>	<i>Daily Average Concentration, mg/l</i>
BOD ₅	26	39	N/A	30	45	N/A
TSS	26	39	N/A	30	45	N/A

<i>Maximum Effluent Limitations</i>			
<u>Effluent Characteristics</u>	<i>Total Monthly Loading Rate ⁽⁵⁾, Pounds/Month Report</i>	<i>Annual Maximum Loading Rate ⁽⁶⁾, Pounds/Year</i>	<i>Monthly Average Concentration, mg/l Report</i>
Total Phosphorus-P ⁽⁴⁾⁽⁷⁾		957	
Total Nitrogen-N ⁽⁴⁾⁽⁷⁾	Report	5,744	Report

<i>Effluent Limitations</i>		
<u>Effluent Characteristics</u>	<i>Maximum</i>	<i>Minimum</i>
Fecal Coliform ⁽⁸⁾	200 MPN/100 ml monthly log mean value	N/A
E. Coli ⁽⁸⁾	126 MPN/100 ml monthly geometric mean	N/A
Total Residual Chlorine ⁽⁹⁾	UV is used In case chlorine or any chlorine compound is used in the treatment process, dechlorination is required to reduce the total residual chlorine to the non-detectable level	N/A
pH	8.5	6.5
Dissolved Oxygen (1/1 to 12/31) (2/1 to 5/31) (6/1 to 1/31)	N/A N/A N/A	5.0 mg/l at any time 6.0 mg/l weekly average 5.5 mg/l monthly average

VI. APPENDIX- A**Effluent Limitations and Monitoring Requirements of the Previous Permit (07-DP-0166)****A.1 Effluent Limitations, Continued^{(1) (2) (3)}**

An annual average flow of 0.105 million gallons per day (mgd) was used in waste load allocation calculations and this unit shall be used when reporting on the Discharge Monitoring Report (DMR) form. Notification is to be provided to the Department at least 180 days before the annual average flow is expected to exceed this flow level. If a permit modification is required, the Department will initiate the public participation NPDES process.

Footnotes for the effluent limitations:

- (1) When this permit is renewed, the new limitations may not be equal to the above limitations. There shall be no discharge of floating solids or visible foam other than trace amounts.
- (2) The permit may also be reopened in accordance with the requirements of MDE's Watershed Permitting Plan under which all discharge permits in a watershed are issued the same year.
- (3) The Upper Chester River is on the 303(d) list of the impaired waters for total nitrogen (TN), total phosphorus (TP), total suspended solids, fecal coliform parameters, combination benthic/fish bioassessments, and methylmercury and poly-chlorinated biphenyls in fish tissue. A Total Maximum Daily Load (TMDL) for nutrients, approved by the EPA on 11/28/2006, allocated TN limit of 18 mg/l and TP limit of 3.0 mg/l with a flow of 0.105 mgd to this facility, which correspond to TN and TP loadings of 5,744 lbs/yr and 957 lbs/yr, respectively. Under Chesapeake Bay Tributary Strategy the performance goals of 3,344 lbs/yr annual load for TN and 557 lbs/yr annual load for TP are established for this facility. The Town of Millington will undertake best efforts to achieve the above-mentioned goals. When TMDLs for other remaining parameters are completed, limits may be imposed, after the public participation process, to incorporate any TMDL requirements. This permit is in conformance with the Chesapeake Bay TMDL for Nitrogen, Phosphorus, and Sediment established on December 29, 2010.
- (4) The permittee shall operate the biological nutrient removal facility on a year round basis in a manner that optimizes the nutrient removal capability of the facility. Total nitrogen is the sum of ammonia-N, organic-N and (nitrite+nitrate)-N based on samples collected on the same day.
- (5) Total monthly loading rate (in pounds/month) for nutrients is a calculated parameter to be reported for each calendar month. It is equal to $\{(\text{monthly average concentration (mg/l)} \times (\text{Total flow in a calendar month (Million Gallons)} \times 8.34)\}$.
- (6) The Annual Maximum Loading Rate (in pounds/year) for nutrients is a calculated parameter to be reported monthly as the sum of the Total Monthly Loading Rates from January through December of the current calendar year.
- (7) The permittee may request that the permit be reopened and modified to include nutrient trading consistent with the most current "Maryland Policy for Nutrient Cap Management and Trading in Maryland's Chesapeake Bay Watershed" guidelines.
- (8) The fecal coliform limit shall be in effect until the E. coli limit becomes effective. The E. coli limit shall take effect one year after the issuance date of the permit. However, the permittee may request in writing that the E. coli limitation become effective sooner.
- (9) Total residual chlorine limitation shall apply only if chlorine or any chlorine-containing compound is used in the wastewater treatment, and hence, the wastewater shall be dechlorinated to reduce effluent total residual chlorine concentration to the non-detectable level. The minimum level (quantification level) for total residual chlorine is 0.10 mg/l. The permittee may report all results below the minimum level as <0.10 mg/l. All results reported below the minimum level shall be considered in compliance.

VI. APPENDIX- A**Effluent Limitations and Monitoring Requirements of the Previous Permit (07-DP-0166)****A.2 Effluent Limitations, Outfall 001 ⁽¹⁾⁽²⁾⁽³⁾**

After appropriate upgrading and approval by the Department that the design capacity of the Millington Wastewater Treatment Plant is sufficient to be rerated to 0.140 mgd, the quality of the effluent discharged by the facility through an outfall at the discharge point- 001 shall be limited at all times as shown below:

<i>Maximum Effluent Limitations</i>						
Effluent Characteristics	Monthly Average Loading Rate, Pounds/day	Weekly Average Loading Rate, Pounds/day	Daily Average Loading Rate, Pounds/day	Monthly Average Concentration, mg/l	Weekly Average Concentration, mg/l	Daily Average Concentration, mg/l
BOD ₅	26	39	N/A	23	34	N/A
TSS	26	39	N/A	23	34	N/A

<i>Maximum Effluent Limitations</i>			
Effluent Characteristics	Total Monthly Loading Rate ⁽⁵⁾, Pounds/Month Report	Annual Maximum Loading Rate ⁽⁶⁾, Pounds/Year	Monthly Average Concentration, mg/l Report
Total Phosphorus-P ⁽⁴⁾⁽⁷⁾		457	
Total Nitrogen-N ⁽⁴⁾⁽⁷⁾	Report	3,344	Report

<i>Effluent Limitations</i>		
Effluent Characteristics	Maximum	Minimum
Fecal Coliform ⁽⁸⁾		N/A
E. Coli ⁽⁸⁾	126 MPN/100 ml monthly geometric mean	N/A
Total Residual Chlorine ⁽⁹⁾	UV is used In case chlorine or any chlorine compound is used in the treatment process, dechlorination is required to reduce the total residual chlorine to the non-detectable level	N/A
pH	8.5	6.5
Dissolved Oxygen (1/1 to 12/31) (2/1 to 5/31) (6/1 to 1/31)	N/A N/A N/A	5.0 mg/l at any time 6.0 mg/l weekly average 5.5 mg/l monthly average

VI. APPENDIX- A

Effluent Limitations and Monitoring Requirements of the Previous Permit (07-DP-0166)

A.2 Effluent Limitations, Continued^{(1) (2) (3)}

An annual average flow of 0.140 million gallons per day (mgd) was used in waste load allocation calculations and this unit shall be used when reporting on the Discharge Monitoring Report (DMR) form. Notification is to be provided to the Department at least 180 days before the annual average flow is expected to exceed this flow level. If a permit modification is required, the Department will initiate the public participation NPDES process.

Footnotes for the effluent limitations:

- ⁽¹⁾ When this permit is renewed, the new limitations may not be equal to the above limitations. There shall be no discharge of floating solids or visible foam other than trace amounts.
- ⁽²⁾ The permit may also be reopened in accordance with the requirements of MDE's Watershed Permitting Plan under which all discharge permits in a watershed are issued the same year.
- ⁽³⁾ The Upper Chester River is on the 303(d) list of the impaired waters for total nitrogen (TN), total phosphorus (TP), total suspended solids, fecal coliform parameters, combination benthic/fish bioassessments, and methylmercury and poly-chlorinated biphenyls in fish tissue. A Total Maximum Daily Load (TMDL) for nutrients, approved by the EPA on 11/28/2006, allocated TN limit of 18 mg/l and TP limit of 3.0 mg/l with a flow of 0.105 mgd to this facility, which correspond to TN and TP loadings of 5,744 lbs/yr and 957 lbs/yr, respectively. Under Chesapeake Bay Tributary Strategy the performance goals of 3,344 lbs/yr annual load for TN and 557 lbs/yr annual load for TP are established for this facility. Due to the expansion, these goals become permit limits, except that the total phosphorus load will be capped at 457 lbs/yr for a flow of 0.140 mgd. When TMDLs for other remaining parameters are completed, limits may be imposed, after the public participation process, to incorporate any TMDL requirements. This permit is in conformance with the Chesapeake Bay TMDL for Nitrogen, Phosphorus, and Sediment established on December 29, 2010.
- ⁽⁴⁾ The permittee shall operate the biological nutrient removal facility on a year round basis in a manner that optimizes the nutrient removal capability of the facility. Total nitrogen is the sum of ammonia-N, organic-N and (nitrite+nitrate)-N based on samples collected on the same day.
- ⁽⁵⁾ Total monthly loading rate (in pounds/month) for nutrients is a calculated parameter to be reported for each calendar month. It is equal to {(monthly average concentration (mg/l) x (Total flow in a calendar month (Million Gallons) x 8.34)}.
- ⁽⁶⁾ The Annual Maximum Loading Rate (in pounds/year) for nutrients is a calculated parameter to be reported monthly as the sum of the Total Monthly Loading Rates from January through December of the current calendar year.
- ⁽⁷⁾ The permittee may request that the permit be reopened and modified to include nutrient trading consistent with the most current "Maryland Policy for Nutrient Cap Management and Trading in Maryland's Chesapeake Bay Watershed" guidelines.
- ⁽⁸⁾ The fecal coliform limit shall be in effect until the E. coli limit becomes effective. The E. coli limit shall take effect one year after the issuance date of the permit. However, the permittee may request in writing that the E. coli limitation become effective sooner.
- ⁽⁹⁾ Total residual chlorine limitation shall apply only if chlorine or any chlorine-containing compound is used in the wastewater treatment, and hence, the wastewater shall be dechlorinated to reduce effluent total residual chlorine concentration to the non-detectable level. The minimum level (quantification level) for total residual chlorine is 0.10 mg/l. The permittee may report all results below the minimum level as <0.10 mg/l. All results reported below the minimum level shall be considered in compliance.

VI. APPENDIX- A**Effluent Limitations and Monitoring Requirements of the Previous Permit (07-DP-0166)****B. Minimum Monitoring Requirements:**

The effluent characteristics listed below shall be monitored as follows:

<u>Effluent Characteristics</u> ⁽¹⁾	<u>Measurement Frequency</u>	<u>Sample Type</u>
BOD ₅	Once per week	8-hr composite
Total Suspended Solids	Once per week	8-hr composite
Total Ammonia Nitrogen as N ⁽²⁾	Once per week	8-hr composite
Total Phosphorus as P ⁽²⁾⁽³⁾	Once per week	8-hr composite
Total Nitrogen as N ⁽²⁾⁽³⁾	Once per week	8-hr composite
(Nitrite + Nitrate) as N ⁽²⁾	Once per week	8-hr composite
Organic Nitrogen as N ⁽²⁾	Once per week	8-hr composite
Orthophosphate as P ⁽²⁾	Once per month	8-hr composite
Fecal Coliform ⁽⁴⁾	Once per week	Grab
E. Coli ⁽⁴⁾	Once per week	Grab
Total Residual Chlorine ⁽⁵⁾	See Footnote- 5	See Footnote- 5
Dissolved Oxygen	Once per day	Grab
pH	Once per day	Grab
Flow ⁽⁶⁾	Continuous	Recorded ⁽⁷⁾
Total Monthly Flow	Daily	Calculated ⁽⁸⁾

VI. APPENDIX- A**Effluent Limitations and Monitoring Requirements of the Previous Permit (07-DP-0166)****B. Minimum Monitoring Requirements, Continued:***Footnotes for the monitoring requirements:*

- (1) "STORET" (short for STORage and RETrieval) is a widely-used repository for water quality data reporting and monitoring. The corresponding STORET codes for the effluent characteristics specified in Special Conditions II.A and II.B are: BOD₅ (00310), Total Suspended Solids (00530), Total Ammonia Nitrogen as N (00610), Total Phosphorus as P (00665), Total Nitrogen as N (00600), (Nitrite + Nitrate) as N (00630), Organic Nitrogen as N (00605), Orthophosphate as P (70507), Fecal Coliform (74055), E. Coli (51040), Total Residual Chlorine (50060), Dissolved Oxygen (00300), pH (00400), Flow (50050), and Total Monthly Flow (82220).
- (2) Monitor only; parameters shall be reported on the monthly operating report as individual results and on the Discharge Monitoring Report (EPA Form 3320-1) as a monthly average concentration and monthly loading values.
- (3) On each monthly *Discharge Monitoring Reports* (EPA Form 3320-1, Rev. 01/06), the permittee shall calculate and report the TN and TP total monthly loads plus year-to-date cumulative loads for the calendar year in question.

Total monthly load (pounds/month) for nutrients is a calculated parameter equal to {(monthly average concentration, mg/l) x (Total flow in a calendar month, Million Gallons) x 8.34}. The cumulative load for the respective nutrient is also a calculated parameter equal to the sum of total monthly loads for each month in that calendar year.

TN and TP concentrations will be reported as a monthly average. Total nitrogen is the sum of Total Ammonia- N, Organic-N and (nitrite + nitrate)-N. All nitrogen parameters shall be measured on the same daily samples.
- (4) The fecal coliform monitoring shall be in effect until the E. coli limit becomes effective. Thereafter, E. coli monitoring requirement shall be in effect.
- (5) The minimum monitoring requirements of once per day, grab sampling for total residual chlorine shall be applicable, only when the wastewater at the Millington WWTP is treated with chlorine or any chlorine compound. The minimum detection level (quantification level) for total residual chlorine is 0.10 mg/l. The permittee may report all results below the minimum level as <0.10 mg/l. All results reported below the minimum level shall be considered in compliance.

VI. APPENDIX- A

Effluent Limitations and Monitoring Requirements of the Previous Permit (07-DP-0166)

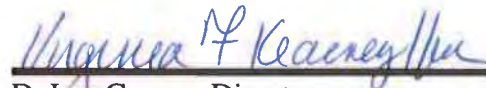
Footnotes for the monitoring requirements, continued:

- (6) Flows shall be reported in millions gallons per day (mgd) to at least the nearest 1,000 gallons per day. (Example: A flow of 524,699 gallons per day shall be reported as 0.525 mgd.). For each calendar month, flows shall be reported on the Monthly Operating Reports as daily individual results, and on the Discharge Monitoring Reports(EPA Form 3320-1, Rev. 01/06) as monthly average (mgd) and daily maximum (mgd)).
- (7) Continuous electronic flow measurement and recording which can produce a permanent record are acceptable to the Department.
- (8) "Total monthly flow" is a calculated parameter equal to sum of the daily flow results in a calendar month. It shall be reported on the Discharge Monitoring Reports(EPA Form 3320-1, Rev. 01/06) as Total monthly flow in millions gallons (MG) to at least the nearest 1,000 gallons. (Example: A flow of 524,699 gallons shall be reported as 0.525 MG).

VI. NPDES PROGRAM

On September 5, 1974, the Administrator of the U.S. Environmental Protection Agency approved the proposal submitted by the State of Maryland for the operation of a permit program for wastewater discharges pursuant to Section 402 of the Clean Water Act.

Pursuant to the aforementioned approval, this discharge permit is both a State of Maryland discharge permit and an NPDES permit.



D. Lee Currey, Director
Water and Science Administration

APPENDIX E:

MES ANNUAL REPORT FOR MILLINGTON WWTP



Larry Hogan GOVERNOR

Boyd K. Rutherford LT. GOVERNOR

Charles Glass, Ph.D., P.E. EXECUTIVE DIRECTOR

February 1, 2022

Mrs. Jo Manning, Town Administrator
Town of Millington
PO Box 330
Millington, Maryland 21651-0330

Dear Mrs. Manning,

The Maryland Environmental Service is pleased to submit the FY2021 Annual Report for the Town of Millington Water & Wastewater Treatment Facilities.

This report is designed to provide an overview of our activities at your facility. We have maintained a format similar to prior years to allow easy reference and comparison. In addition to highlighting operations activities, the report contains useful information regarding budgetary expenditures, regulatory permit status, and flows. The section entitled "Scheduled or Recommended Improvements" lists any significant planned or proposed improvements which MES believes will make the operation more efficient and reliable.

At MES, it is our belief that communication is essential to our success. Once you have had the opportunity to review this report, I encourage you to contact me at (410) 729-8390 if you would like to discuss any aspect of our operation. On behalf of the entire staff, thank you for the opportunity to be of service and we look forward to continuing our relationship in the future.

Kind regards,

Tiff Bradshaw

Tiff Bradshaw
Division Chief
Water & Wastewater Division

**Town of Millington
Water & Wastewater Treatment Facilities
FY 2021 Annual Report**

INDEX

FY 2021 REPORT

OPERATIONS & MAINTENANCE SUMMARY

SCHEDULED OR RECOMMENDED IMPROVEMENTS

REGULATORY COMPLIANCE STATUS

Maryland Environmental Service
Water and Wastewater Division
259 Najoles Road
Millersville, Maryland 21108

FY 21 COMBINED REPORT

WTP:

FY 21 Budget	\$54,906.00
FY 21 Actual	\$48,449.83
FY 21 % Budget Spent	88%
FY 22 Budget	N/A

WWTP:

FY 21 Budget	\$109,259.00
FY 21 Actual	\$63,420.83
FY 21 % Budget Spent	58%
FY 22 Budget	N/A

OPERATIONS AND MAINTENANCE SUMMARY

The Maryland Environmental Service (MES) has operated and maintained the Town of Millington Water and Wastewater Treatment Facilities during FY21. The water system was operated according to the mandates of the Safe Drinking Water Act (SDWA). The wastewater facility was operated with 2 violations during the past fiscal year. Listed as follows are notable operations and maintenance activities that have occurred at the treatment facilities during the FY 2021:

Water

- The MES staff tracked the facility operations and treatment process on a daily basis through testing, recording flows and elapsed time indicator (ETI) reading on the equipment. Information is recorded on the monthly operating report (MOR), logbooks, and meter sheets.
- The MES staff replaced numerous water meters at homes where the old meter stopped working.
- The MES staff conducted numerous accuracy tests on water meters when homeowners question their water bill
- The MES staff conducted numerous locates of water lines at individual homes within the town of Millington.

- The MES staff collected the monthly, quarterly, and yearly drinking water samples required by MDE.
- The MES staff conducted monthly water meter rereads.
- The MES staff flushed hydrants bi-annually to remove accumulated iron from the water mains.
- The MES staff repaired a leaking water meter pit connection.
- With approval from the Town, MES contacted a company to make repairs of leaking water meter pits.

SCHEDULED OR RECOMMENDED IMPROVEMENTS

- No recommendations at this time.

Wastewater

- The MES staff tracked the facility operations and treatment process on a daily basis through testing, recording flows and elapsed time indicator (ETI) reading on the equipment. Information is recorded on the monthly operating report (MOR), logbooks, and meter sheets.
- The MES electrical maintenance staff performed the annual calibration of the facility's final effluent flow meter as per MDE requirements.
- The MES staff continued to feed Micro CG to help feed the biomass of the treatment system. This helps to provide a carbon source for the biomass in the Biolac and helps the facility to perform total nitrogen reduction as per permit regulations.
- The MES maintenance staff performed yearly maintenance on the generator unit located at the wastewater facility.
- The MES staff purchased and installed new bulbs and sleeves for the UV disinfection unit.
- The MES staff pulled the influent pumps from the wet well on a few occasions to unclog the pumps and remove debris.
- The MES staff changed the oil on all blower units on a quarterly basis.
- The MES staff greased the bearings and replaced the filters on all the blower units.

- The MES staff greased the bearings on the RAS pumps and non-potable water pumps.
- The MES staff changed the oil in the bar screen unit.
- The MES staff had sludge hauled from the facility to the landfill when necessary.
- The MES staff adjusted the "wave ox" settings on the Biolac tank to help with the nitrification/denitrification process.
- The MES staff continued to feed aluminum sulfate to the Biolac system to reduce Total Phosphorus per permit regulations.
- The MES staff conducted numerous locates of sewer mains and laterals for individual homes located within Town limits.
- The MES staff reported to numerous high-level alarms in the influent wet well. The majority of the alarms occur during rain events.
- The MES staff cleaned vegetation from the clarifier on numerous occasions.

SCHEDULED OR RECOMMENDED IMPROVEMENTS

- No recommendations at this time

REGULATORY COMPLIANCE STATUS

Water

FY21 Average Daily Flow: 68,343 gallons per day
Total Flow: 24,945,079 gallons

Wastewater

FY21 Average Daily Flow: 0.0845 million gallons per day (mgd)
Total Flow: 30,830,000 gallons

Sewage Sludge Management: 57.61 wet tons removed in FY 2021 to Midshore II Landfill.

- Transport to Midshore Landfill II, permit number 2015-STR-5579, expires 5/20/2025
- Transport to Dorsey Run WWTP, permit number 2018-STR-4601, expires 4/25/2028
- Transport to Sudlersville WWTP (seed sludge), permit number 2016-STR-5651, expires 5/12/2026

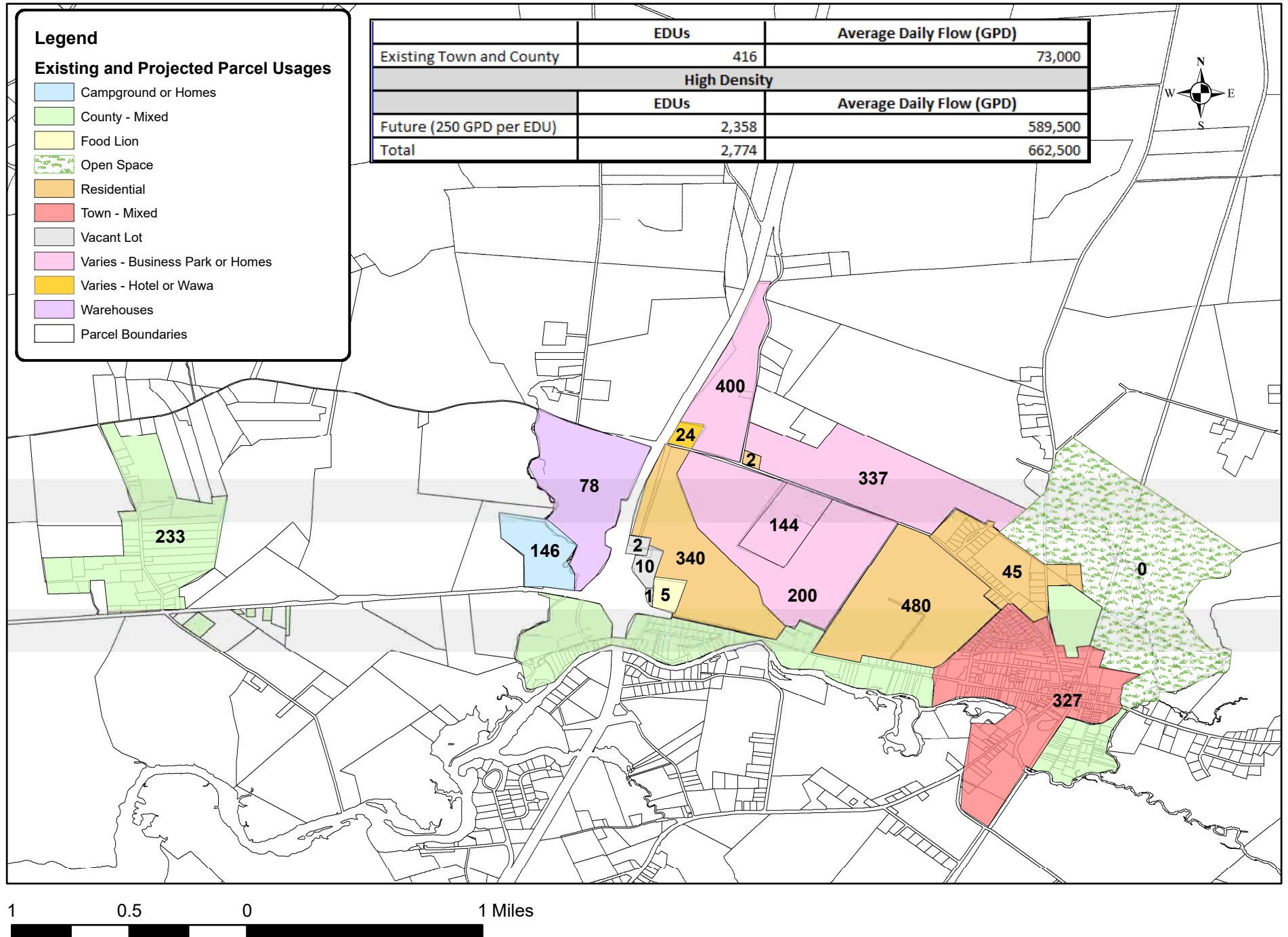
To satisfy State laws, this plant is required to monitor the effluent for 10 individual parameters. During FY21 this required a minimum of separate analyses and measurements to be performed. This facility violated the NPDES permit limitations 1 times for a compliance rate as follows:

PARAMETER	REQUIRED ANALYSES	VIOLATIONS	% COMPLIANCE
BOD	52	0	100%
TSS	52	0	100%
Enterococcus	52	2	97%
Dissolved Oxygen	365	0	100%
pH	365	0	100%
TKN	52	0	100%
TP	52	0	100%
NH3	52	0	100%
N+N	52	0	100%
Ortho P	12	0	100%
TOTAL	1106	2	99%

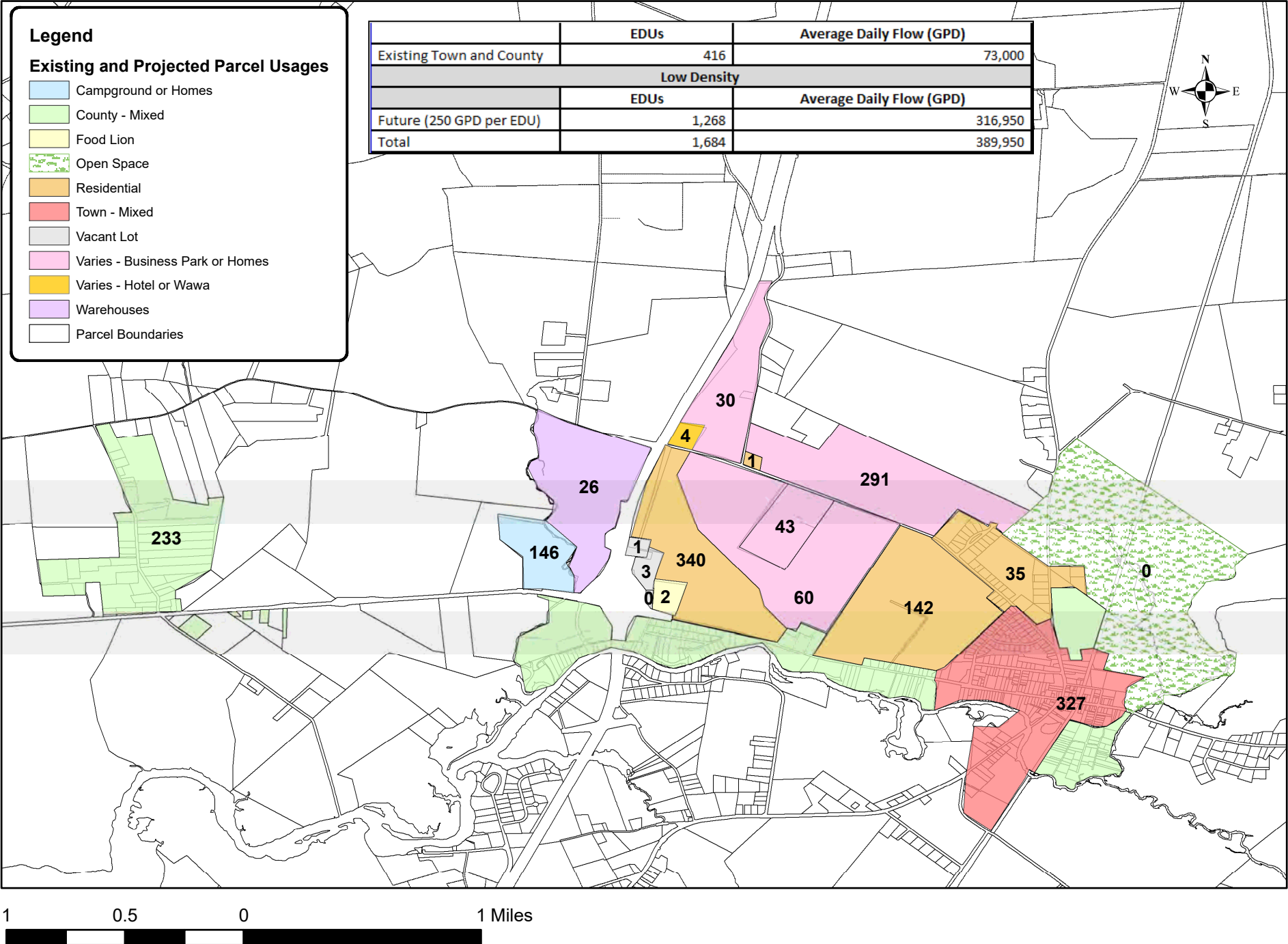
APPENDIX F:

EDU AND GROWTH PROJECTIONS

Kent County & Town of Millington Upper EDU Projections



Kent County & Town of Millington Lower EDU Projections



Kent County and Town of Millington Parcel EDU Summaries:

Location	Total EDU High Density	Total EDU Low Density	Total Flow High	Total Flow Low	Source	Notes
Existing Town	274	274	48,082	48,082	2020 EDU Count	Per Current Records
Existing County	142	142	24,918	24,918	2020 EDU Count	Per Current Records
Future Town	53	53	13,250	13,250	2020 EDU Count	Per Current Records
Future County	91	91	22,750	22,750	2020 EDU Count	Per Current Records
1W	78	26	19,500	6,500	Richardson 4/15/22	Two Warehouses, 650k SF, 0.01-0.03 gpd per SF, larger section along Rt. 301
1W	146	146	36,500	36,500	Richardson 4/28/22	campground or homes, 143 units, smaller section along Rt 291 at 250 gpd per unit
1E	340	340	85,000	85,000	Richardson 4/14/22	240 apartments and 100 affordable units @ 250 gpd per unit
3A+B	400	30	100,000	7,500	Richardson 4/28/22	4 car dealers, or 250k SF business park 0.03 gpd per SF, or 400 unit residential @ 250 gpd per unit
4	24	4	6,000	1,000	Richardson 4/14/22	100 room hotel (60 gpd per room), Wawa, car dealership, selfstorage (10k SF @ 0.1 gpd per SF)
6	10	3	2,500	750	*Waiting on updates	*Discussions scheduled for May 20th between Owner and Richardson
10	144	43	36,000	10,800	Richardson 4/14 & 4/28	144 residential @ 250 gpd per unit or 10k SF warehouse per acre at 0.03 gpd per SF
11	200	60	50,000	14,900	Richardson 4/14 & 4/28	(250 gpd per EDU) 200 residential or 10k SF warehouse per acre at 0.01 gpd per SF
2	5	2	1,250	500	Existing	Existing Food Lion
5	1	-	250	-	N/A	Town owned parcel, 0.6 acre size
7	2	1	500	250	N/A	Lot size 1.1 acre
8	2	1	500	250	N/A	Lot size 2 acre
12	480	142	120,000	35,500	Maloney 4/11/22 & Richardson 4/14	480 EDUs total anticipated with mixed use, or 142 residential
13	337	291	84,250	72,750	Evans 3/25 & Richardson 4/14	337 residential units, or 261 residential and 30 commercial
Kent County Septic Users	45	35	11,250	8,750	Current Records	Per Current Records

	EDUs	Average Daily Flow (GPD)
Existing Town and County	416	73,000
Low Density		
	EDUs	Average Daily Flow (GPD)
Future (250 GPD per EDU)	1,268	316,950
Total	1,684	389,950
High Density		
	EDUs	Average Daily Flow (GPD)
Future (250 GPD per EDU)	2,358	589,500
Total	2,774	662,500

APPENDIX G:
SHORT LIVED ASSET TABLE



614, N. Dupont Highway
Dover, DE 19901

Kent County Regional WWTP Short Lived Assets

Wastewater Treatment Facility Common Assets

Asset	Install Year	Estimated Years of Service	Replacement Year	Replacement Cost
Effluent Sampler	2023	15	2038	\$3,500.00
Pressure Gauge, Sensors, Floats, etc.	2023	10	2033	\$15,000.00
Headworks Grit Removal Equipment	2023	20	2043	\$370,000.00
Headworks Influent Screen Equipment	2023	20	2043	\$70,000.00
Headworks Influent Pumps	2023	20	2043	\$50,000.00
Headworks Screen and Grit Dumpsters	2023	20	2043	\$20,000.00
Flow Equalization Discharge Pumps	2023	20	2043	\$40,000.00
Flow Equalization Blowers	2024	20	2044	\$80,000.00
Flow Equalization Coarse Bubble Diffusers	2023	20	2043	\$50,000.00
Sludge Digestion Diffusers	2023	20	2043	\$75,000.00
Sludge Digestion Blowers	2023	20	2043	\$175,000.00
Sludge Digestion Decant Pumps	2023	20	2043	\$30,000.00
Denitrification Filter Media	2023	10	2033	\$10,000.00
Denite Filter Feed Pumps	2023	20	2043	\$20,000.00
Denite Filter Air Compressor	2023	20	2043	\$15,000.00
UV Lamp Replacement	2023	5	2028	\$7,000.00
Effluent Pump Station	2023	20	2043	\$100,000.00
Back-up Power Generator	2023	20	2043	\$250,000.00
Belt Filter Press Equipment	2023	20	2043	\$500,000.00
Electrical/HVAC/Mechanical General Equipment	2023	20	2043	\$350,000.00
Control Panels and SCADA Associated Equipment	2023	20	2043	\$100,000.00
Site Work and Paving	2023	20	2043	\$250,000.00

Collection System

Asset	Install Year	Estimated Years of Service	Replacement Year	Replacement Cost
Rob Vanary Park Pump Station	2023	20	2043	\$175,000.00
New Pump Station at Existing WWTP	2023	20	2043	\$185,000.00

Note: pump station costs are for pumps and electric only

SBR Wastewater Treatment Facility Assets

Asset	Install Year	Estimated Years of Service	Replacement Year	Replacement Cost
SBR Blowers	2023	20	2043	\$175,000.00
SBR Diffusers	2023	20	2043	\$75,000.00
SBR Mixers	2023	20	2043	\$100,000.00
SBR Decanter Assemblys	2023	20	2043	\$90,000.00
SBR Sludge Transfer Pumps	2023	20	2043	\$25,000.00

Note: PEQ & Digester is commonly shared equipment

Bardenpho Wastewater Treatment Facility Assets

Asset	Install Year	Estimated Years of Service	Replacement Year	Replacement Cost
Biological Process Mixers and Motors	2023	20	2043	\$250,000.00
Fine Bubbler Diffusers	2023	20	2043	\$75,000.00
Biological Process Blowers	2023	20	2043	\$90,000.00
Mixed Liquor Recycle Pumps	2023	20	2043	\$20,000.00
Return Activated Sludge Pumps	2023	20	2043	\$25,000.00
Waste Activated Sludge Pumps	2023	20	2043	\$2,000.00
Clarifier Drive Motor	2023	20	2043	\$120,000.00
Clarifier Sludge Collection Arms and Drums	2023	20	2043	\$100,000.00
Clarifier Surface Scum Skimming Equipment	2023	20	2043	\$75,000.00

MBR Wastewater Treatment Facility Assets

Asset	Install Year	Estimated Years of Service	Replacement Year	Replacement Cost
Pre-Anoxic Mixers	2023	20	2043	\$50,000.00
Pre-Aeration Diffusers	2023	20	2043	\$25,000.00
Pre-Aeration Blowers	2023	20	2043	\$90,000.00
Internal Recycle Pumps	2023	20	2043	\$35,000.00
Post-Anoxic Mixers	2023	20	2043	\$60,000.00
Submerged Membrane Units	2023	10	2033	\$650,000.00
MBR Blower	2023	20	2043	\$115,000.00
Permeate Pumps	2023	20	2043	\$30,000.00
Return Activated Sludge Pumps	2023	20	2043	\$25,000.00
Waste Activated Sludge Pumps	2023	20	2043	\$20,000.00