

PRELIMINARY ENGINEERING REPORT

Fairbank and Bar Neck Septic Elimination



Talbot County

Prepared by: Mr. Robert D Rauch

Registration State: Maryland

Registration Number: 11024



RAUCH

inc.

engineering design & development services

www.raucheng.com | design@raucheng.com | (410) 770-9081

Rauch Inc.
106 N Harrison St.
Easton, MD

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Project Overview

**COUNTY OF TALBOT
PER & ER FOR FAIRBANK AND BAR NECK SEPTIC RETIREMENT**

The Villages of Fairbank and Bar Neck are approximately 8,000 feet and 10,000 feet, respectively, south of the nearest connection point to the Region V (Tilghman) wastewater collection system. These villages were identified in the 1990 and 1992 Updates of the Talbot County Comprehensive Water and Sewerage Plan as having a high priority for sewer service due to failing septic systems. The soils on Tilghman are poorly draining, with high groundwater levels. Many of the properties in Bar Neck and Fairbank have septic systems with drain fields that penetrate the groundwater and a majority of the houses are within 500 feet of the adjacent Chesapeake Bay and Choptank River waters (EXHIBIT 0-1).

By connecting these resident structures to a centralized wastewater treatment system, these non-point source discharges will be converted to a regulated point source discharge. Depending upon the availability of USDA or MDE Bay Restoration Funding to upgrade minor wastewater treatment plants, the residential properties in the Villages of Fairbank and Bar Neck could see a TN reduction of greater than 90% when the flows are received at a WWTP facility with Enhanced Nutrient Removal technologies. This proposed project would provide septic elimination for approximately 124 lots with 104 of these being improved residences.



Septic System Retirement

Talbot County has proposed a septic elimination project for the communities of Fairbanks and Bar Neck in the southern portion of Tilghman Island. Septic elimination is planned on 104 lots with stub outs proposed on an additional 20 lots to replace failing or underperforming septic systems which pose environmental concerns in the area. The septic systems will be replaced by one of the evaluated alternatives and will send residential waste currently treated through private septic systems to a central collection system connected to the existing Region V treatment plant at Tilghman. There are 5 alternatives considered as septic elimination methods and are shown below:

- i. No Action
- ii. Conventional Gravity Sewers
- iii. Grinder Pump Systems
- iv. STEP Systems
- v. Vacuum Sewer

Sewer Mains

To serve the selected alternative, This PER proposes the installation of approximately 18,500 LF of sewer main of varying sizes to serve the individual communities along Black Walnut Point Road and Bar Neck Road. Small diameter sewer mains (4" in diameter or less) will be installed in the community areas and along Black Walnut Point Road connecting to the Tilghman sewer network at an existing terminal manhole with a 12" gravity outlet to Tilghman. This connection will allow the sewer effluent to be sent to the existing Region V collection system and treated by the WWTP located in Tilghman.

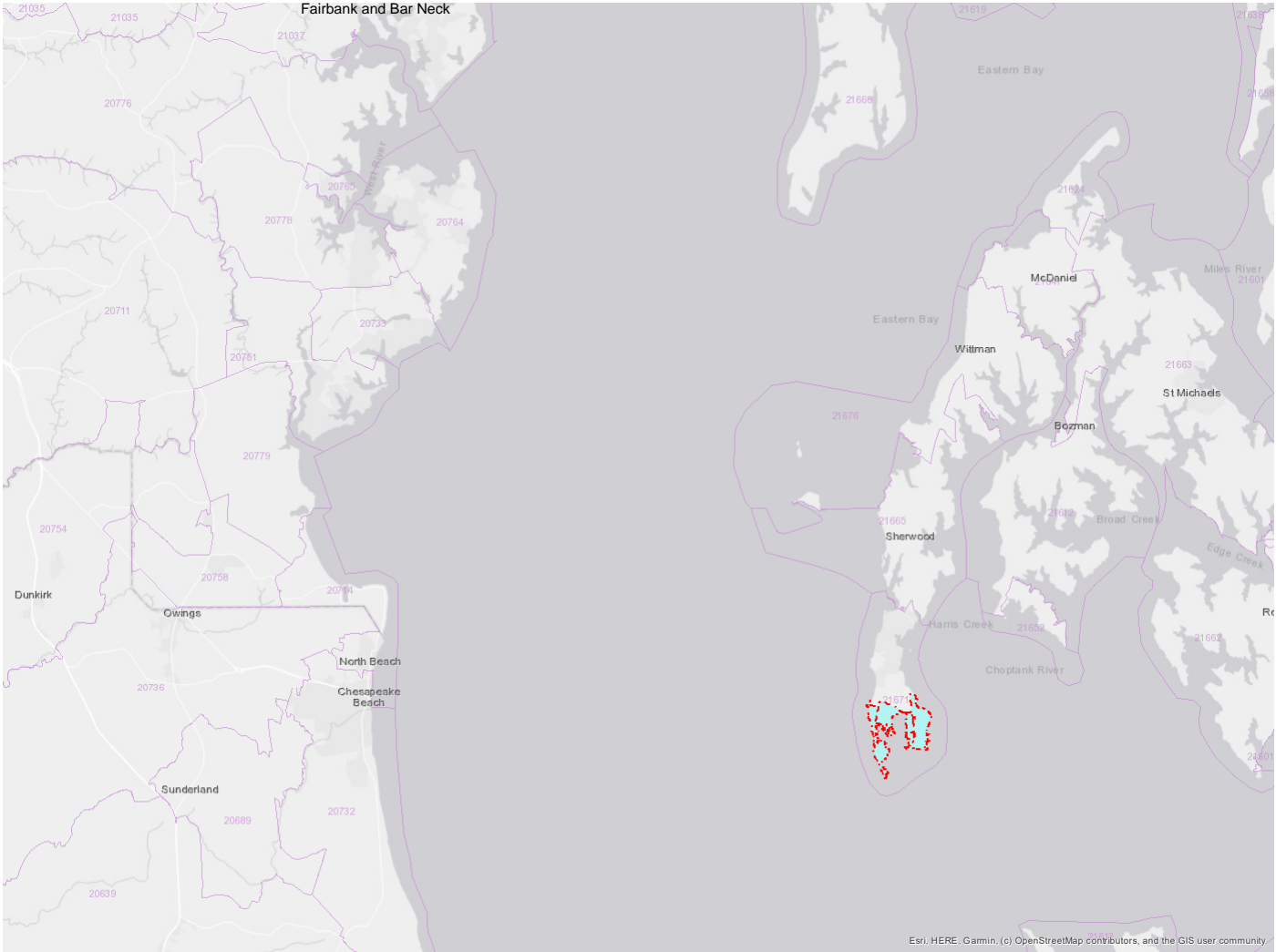
Current Facility Description

The communities of Fairbank and Bar Neck on the southern portion of Tilghman Island currently employ residential septic systems for sewerage treatment. These communities are made up of approximately 124 residential lots. These villages were identified in the 1990 and 1992 Updates of the Talbot County Comprehensive Water and Sewerage Plan as having a high priority for sewer service due to failing septic systems. The soils on Tilghman are poorly draining, with high groundwater levels. Many of the properties in Bar Neck and Fairbank have septic systems with drain fields that penetrate the groundwater, and a majority of the houses are within 500 feet of the adjacent Chesapeake Bay and Choptank River waters. Considering the age of the systems, the poorly draining soils, and the future sea level rise, the performance of the existing septic systems will continue to degrade and fail at an increasingly rapid rate as sea level elevations continue to rise. These factors have promoted this project to a high priority for Talbot County.

Proposed Facility Description

Talbot County proposes a STEP/STE sewer collection system to discontinue the use of septic tank/soil absorption systems in the communities of Fairbanks and Bar Neck on the southern portion of Tilghman Island. Each of the 104 lots shown on the proposed project map will use the selected alternative for sewerage collection and disposal and that alternative will stub out to an additional 20 undeveloped residential lots. By connecting these communities to a centralized wastewater collection and treatment system, residential septic systems which at best are marginal and at worst failed with surface discharge will reduce the health risks associated with failed septic system surface discharges, bay water quality degradation by contaminated stormwater runoff, and groundwater nitrate concentrations within the two communities.

Service Area(s)		
Service Area Name	Population	Square Miles
Fairbank and Bar Neck - Existing Area	110	0.64



Proposed Septic Elimination Service Area

The communities of both Fairbank and Bar Neck are the proposed service areas to be added to the Talbot County Region V sewer collection and treatment system.

Watersheds

The communities of Faribank and Bar Neck are located adjacent to the Choptank watershed and the Chesapeake Bay. These watersheds are vital to the habitat, environment, and the health of the region. Any and all actions must take into account the impacts to these resources. A contributing factor of the importance of the proposed septic elimination project is the health of these waterways by reducing the TN associated with the existing poorly functioning septic systems. By converting existing septic systems to a centralized collection and treatment system, the County is in a better position to address environmental concerns and contributing factors that improve the health of the littoral waters abutting the two communities are reduction in oxygen demand, ammonia N, TSS, and E. coli count. However, the environmental and pollution control benefits of the septic retirement will not be fully realized until the County upgrades the Region V treatment plant to BNR or ENR treatment levels.

Groundwater

Talbot County's public and private water users draw drinking water from several major confined groundwater aquifers, many of which (particularly the Aquia and Piney Point) are widely used throughout the Eastern Shore. Groundwater and surface water resources are also linked. Water from surficial aquifers can comprise a significant amount of the base flow of streams and rivers. While groundwater withdrawn through wells is typically returned to the ground or surface via point source discharges, septic systems, and absorption of runoff from outdoor water uses (such as watering of lawns), large withdrawals can potentially impact the quality and quantity of flows in nearby surface water bodies. Reducing the TN from the existing septic systems will improve the quality of the groundwater which feeds some local residential wells and also feeds local watersheds.

Black Walnut Point Natural Resource Management Area

South of the community of Fairbank, The Maryland State Department of Natural Resources owns natural resource management area. This conservation area is completely outside of the proposed project area but should be considered during the design phase because the area is a beneficiary to the positive changes consequential to the proposed project.



Population Trends								
Service Area	1990	2000	2010	Annual Growth	2020	2030	2040	2050
Fairbank and Bar Neck	110	110	110	-0.00%	110	110	110	110
Total	110	110	110		110	110	110	110

Population

The communities of Fairbank and Bar Neck have an estimated permanent population of 110 due to the mix of full-time residents and part-time residents. However, when including the number of full time and part time residents, the number may be closer to 239 based on 105 lots x 2.28 persons per household (Talbot County Average). This population is expected to remain stable for the foreseeable future. Though, if this project is funded and completed, there should be the expectation that this will incentivize development and possibly increase the population of these communities. The existing Region V WWTP in Tilghman is limited in its ability to expand capacity. Any significant development would require an upgrade to the Region V WWTP or consolidation to the existing Region II WWTP. Both options are being evaluated by the County for feasibility. Until an alternative is chosen, population in this analysis will remain flat as the capacity in the current Region V WWTP is limited especially after allocation of capacity to the Fairbanks and Fair Bank villages.

YEAR	2018	2019	2020	2021	2022
Current Capacity	150,000 gpd	150,000 gpd	150,000 gpd	150,000 gpd	150,000 gpd
Report Daily Average Flow	119,992 gpd	85,510 gpd	117,000 gpd	85,675 gpd	82,513 gpd
Remaining Capacity	30,008 gpd	64,490 gpd	33,000 gpd	64,325 gpd	67,481 gpd

From the 2023 DRAFT Report of the Review of the Talbot County Comprehensive Water and Sewer Plan, pg 81

AREAS	PROJECTED NUMBER OF EQUIVALENT DWELLING UNITS	ESTIMATED SEWERAGE FLOW (gpd)
Current Lots Served		84,094
Infill Lots	60	7,000
Tilghman Island Beach	40	Connected in 2004/2005
Avalon Phases 4 and 5	Added to infill lots	
Paw Paw Cove (unprogrammed)	Added to infill lots	
Rude Avenue (unprogrammed)	Added to infill lots	
Inflow and Infiltration		35,898
Remaining WWTP Capacity		23,008
Future Sewer Extension Bar Neck and Fairbank	Up to 146 – Grinder Pumps	18,250
REMAINING CAPACITY		4,758

From the 2023 DRAFT Report of the Review of the Talbot County Comprehensive Water and Sewer

Plan, pg 82

Community Engagement

Community Engagement in the planning process is required at five intervals:

1. The planning process of this project will be advertised for discussion and review at Talbot County Council meetings.
2. Public information sheets will be prepared which include project scope and impacts on rates and operations.
3. The public, and more specifically, businesses and households affected will be given sufficient advanced notice of project details including anticipated planning, start and end dates.
4. The public will be given periodic updates on project progress
5. Affected businesses and households will be given sufficient advanced notice of any water system interruption of service due to construction progress, including anticipated start/end dates and time intervals.

At this stage, Talbot County has held a public hearing for "A BILL TO AUTHORIZE A CAPITAL PROJECT FOR THE CONNECTION OF BAR NECK AND FAIRBANK COMMUNITIES TO THE REGION V (TILGHMAN) WASTEWATER TREATMENT PLANT". This public hearing was held on July 23, 2019. A bill, 1418, was passed by the Council following the public hearing authorizing this project to move forward.

Additionally, A public hearing was held on Tuesday, April 12, 2022 and on Tuesday, April 26, 2022 on Resolution 318: "A RESOLUTION TO AMEND THE TALBOT COUNTY COMPREHENSIVE WATER AND SEWER PLAN FOR THE PURPOSE OF ADDING OR MODIFYING THE TALBOT COUNTY CAPITAL PROJECT FOR FISCAL YEARS 2023 AND 2024 TO ADD A NEW CAPITAL PROJECT IN THE AMOUNT OF \$2.190 MILLION TO ELIMINATE SEPTIC SYSTEMS IN THE VILLAGES OF BAR NECK AND FAIRBANK BY EXTENDING SEWER SERVICE FROM THE REGION V (TILGHMAN) WASTEWATER SYSTEM".

Furthermore, a public hearing was held on Tuesday, April 11th 2023 on Resolution 339 "A RESOLUTION TO AMEND THE TALBOT COUNTY COMPREHENSIVE WATER AND SEWER PLAN TO RECLASSIFY AND REMAP CERTAIN REAL PROPERTIES IN AND AROUND THE VILLAGES OF BBAR NECK AND FAIRBANK FROM UNPROGRAMMED SO S-1 IMMEDIATE PRIORITY STATUS FOR SEWER SERVICE FROM THE REGION V (TILGHMAN) WASTEWATER SYSTEM".

Bill 1418

**COUNTY COUNCIL
OF
TALBOT COUNTY, MARYLAND**

2019 Legislative Session, Legislative Day No. : June 25, 2019

Bill No.: 1418

Expiration Date: August 29, 2019

Introduced by: Mr. Callahan, Mr. Divilio, Mr. Leshner, Mr. Pack, Ms. Price

**A BILL TO AUTHORIZE A CAPITAL PROJECT FOR THE CONNECTION OF
BAR NECK AND FAIRBANK COMMUNITIES TO THE REGION V
(TILGHMAN) WASTEWATER TREATMENT PLANT**

By the Council: June 25, 2019

Introduced, read first time, ordered posted, and public hearing scheduled on Tuesday,
July 23, 2019 at 6:30 p.m. in the Bradley Meeting Room, South Wing, Talbot County
Courthouse, 11 North Washington Street, Easton, Maryland 21601.

By Order Susan W. Moran
Secretary

**A BILL TO AUTHORIZE A CAPITAL PROJECT FOR THE CONNECTION OF
BAR NECK AND FAIRBANK COMMUNITIES TO THE REGION V
(TILGHMAN) WASTEWATER TREATMENT PLANT**

BE IT ENACTED BY the County Council of Talbot County, Maryland, as follows:

SECTION 1: The connection of the Bar Neck and Fairbank communities to the Region V (Tilghman) Wastewater Treatment Plant is hereby authorized as a capital project. The scope of work includes, but is not limited to, the design, engineering, property acquisitions and construction of a sewer collection and pumping systems to connect the residences and businesses located in Bar Neck and Fairbank communities to the Region V (Tilghman) Wastewater Treatment Plant.

SECTION 2: The Talbot County Council is hereby authorized to expend up to \$2,000,000 for the completion of this project. The project will be funded grants, if awarded, and by long-term borrowing not to exceed \$2,000,000. Acceptance of federal and State grants for this capital project is hereby authorized. Borrowing to finance this capital project for this project is hereby authorized. Approval of this capital project includes authorization to expend funds, not to exceed the total amount of the appropriation, for all associated transactional costs and for incidental and customary costs and charges associated with, and reasonably required for, financing, planning, design, construction, and completion of the project. All costs incurred for this capital project shall be repaid from revenues generated from fees paid by the users of this sewer collection system.

SECTION 3: This Ordinance will take effect sixty (60) calendar days from the date of enactment.

PUBLIC HEARING

Having been posted and Notice of time, date, and place of hearing, and Title of Bill No. 1418 having been published, a public hearing was held on Tuesday, July 23, 2019 at 6:30 p.m. in the Bradley Meeting Room, South Wing, Talbot County Courthouse, 11 North Washington Street, Easton, Maryland 21601.

BY THE COUNCIL

Read the third time.

ENACTED: **July 23, 2019**

By Order *Susan W. Moran*
Susan W. Moran, Secretary

Pack -	Aye
Divilio -	Aye (via absentee ballot)
Callahan -	Aye
Price -	Aye
Leshner -	Aye

EFFECTIVE: September 21, 2019

Resolution 318

COUNTY COUNCIL

OF

TALBOT COUNTY

2022 Legislative Session, Legislative Day No.: March 8, 2022

Resolution No.: 318

Introduced by: Mr. Callahan, Mr. Divilio, Mr. Leshner, Mr. Pack, Ms. Price

A RESOLUTION TO AMEND THE TALBOT COUNTY COMPREHENSIVE WATER AND SEWER PLAN FOR THE PURPOSE OF ADDING OR MODIFYING THE TALBOT COUNTY CAPITAL PROJECT FOR FISCAL YEARS 2023 AND 2024 TO ADD A NEW CAPITAL PROJECT IN THE AMOUNT OF \$2.190 MILLION TO ELIMINATE SEPTIC SYSTEMS IN THE VILLAGES OF BAR NECK AND FAIRBANK BY EXTENDING SEWER SERVICE FROM THE REGION V (TILGHMAN) WASTEWATER SYSTEM

By the Council: March 8, 2022

Introduced, read the first time, and ordered posted, with Public Hearing scheduled on Tuesday, April 12, 2022, at 6:30 p.m. and on Tuesday, April 26, 2022 at 6:30 p.m. in the Bradley Meeting Room, South Wing, Talbot County Courthouse, 11 North Washington Street, Easton, Maryland 21601.

By order:



Susan W. Moran, Secretary

A RESOLUTION TO AMEND THE TALBOT COUNTY COMPREHENSIVE WATER AND SEWER PLAN FOR THE PURPOSE OF ADDING OR MODIFYING THE TALBOT COUNTY CAPITAL PROJECT FOR FISCAL YEARS 2023 AND 2024 TO ADD A NEW CAPITAL PROJECT IN THE AMOUNT OF \$2.190 MILLION TO ELIMINATE SEPTIC SYSTEMS IN THE VILLAGES OF BAR NECK AND FAIRBANK BY EXTENDING SEWER SERVICE FROM THE REGION V (TILGHMAN) WASTEWATER SYSTEM

WHEREAS, the Talbot County Comprehensive Water and Sewer Plan (the “CWSP”) contains capital projects for water and sewer service in Talbot County, Maryland (the “County”); and

WHEREAS, the County Council of Talbot County (the “County Council”) desires to amend the CWSP for the purpose of including the capital project identified by the Talbot County Engineer for Fiscal Years 2023 and 2024 into Table 27 of the CWSP, entitled “Talbot County Region V Sanitary District (Tilghman) Capital Improvement Projects;” and

WHEREAS, in accordance with the requirements of Md. Code Ann., Envir. § 9-506(a)(1)(i), the proposed CWSP amendment set forth herein has been submitted to the Talbot County Planning Commission (the “Planning Commission”), as well as to the Talbot County Public Works Advisory Board, for review for consistency with planning programs for the area; and

WHEREAS, on April 20, 2022, the Planning Commission certified that the proposed CWSP amendment set forth herein is consistent with the Comprehensive Plan as required by Md. Code Ann., Envir. 506(a)(1)(ii);

NOW, THEREFORE, BE IT RESOLVED BY THE COUNTY COUNCIL OF TALBOT COUNTY, MARYLAND, that the Talbot County Comprehensive Water and Sewer Plan shall be and is hereby amended as follows:

SECTION ONE: The above recitals are hereby incorporated as if fully set forth herein.

SECTION TWO: This project will extend sewer service from the Region V (Tilghman) Sanitary District to approximately 146 residential properties consisting of improved and unimproved lots in and around the Villages of Bar Neck and Fairbank to eliminate septic systems in areas of high groundwater and having poorly drained soils.

SECTION THREE: On January 31, 2022, the County submitted an application to the Maryland Department of the Environment (“MDE”) seeking grant and loan funds for this capital project.

SECTION FOUR: Table 27 of the CWSP, entitled “Talbot County Region V (Tilghman) Sanitary District Capital Improvement Projects,” shall be amended as follows:

TABLE 27. TALBOT COUNTY REGION V (TILGHMAN) SANITARY DISTRICT CAPITAL IMPROVEMENT PROJECTS		
PROJECT DESCRIPTION	PROPOSED FISCAL YEAR	COMMENTS
Extension of sewer to lots in and around the villages of Bar Neck and Fairbank as part of Talbot County's Septic System Elimination System Program - \$2.190 Million	2023 2024	This project will connect up to 146 residential properties to the Region V Wastewater System

SECTION FIVE: This Resolution shall take effect immediately upon the date of its adoption.


PUBLIC HEARING

Having been posted and Notice, Time and Place of Hearing, and Title of Resolution No. 318 having been published, a public hearing was held on Tuesday, April 12, 2022 at 6:30 p.m. and on Tuesday, April 26, 2022 at 6:30 p.m. in the Bradley Meeting Room, South Wing, Talbot County Courthouse, 11 North Washington Street, Easton, Maryland.

BY THE COUNCIL

Read the second time:

Adopted: **April 26, 2022**

By Order: 
Susan W. Moran, Secretary

Callahan	-	Aye
Divilio	-	Aye
Leshner	-	Aye
Price	-	Aye
Pack	-	Aye

Effective: **April 26, 2022**

Resolution 339

**COUNTY COUNCIL
OF
TALBOT COUNTY**

2023 Legislative Session, Legislative Day No.: March 14, 2023

Resolution No.: 339

Introduced by: Mr. Callahan, Ms. Haythe, Mr. Leshner, Ms. Mielke, Mr. Stepp

A RESOLUTION TO AMEND THE TALBOT COUNTY COMPREHENSIVE WATER AND SEWER PLAN TO RECLASSIFY AND REMAP CERTAIN REAL PROPERTIES IN AND AROUND THE VILLAGES OF BAR NECK AND FAIRBANK FROM UNPROGRAMMED TO "S-1" IMMEDIATE PRIORITY STATUS FOR SEWER SERVICE FROM THE REGION V (TILGHMAN) WASTEWATER SYSTEM

By the Council: March 14, 2023

Introduced, read the first time, and ordered posted, with Public Hearing scheduled on Tuesday, April 11, 2023 at 6:30 p.m. in the Bradley Meeting Room, South Wing, Talbot County Courthouse, 11 North Washington Street, Easton, Maryland 21601.

By order: 
Susan W. Moran, Secretary

A RESOLUTION TO AMEND THE TALBOT COUNTY COMPREHENSIVE WATER AND SEWER PLAN TO RECLASSIFY AND REMAP CERTAIN REAL PROPERTIES IN AND AROUND THE VILLAGES OF BAR NECK AND FAIRBANK FROM UNPROGRAMMED TO “S-1” IMMEDIATE PRIORITY STATUS FOR SEWER SERVICE FROM THE REGION V (TILGHMAN) WASTEWATER SYSTEM

WHEREAS, on October 22, 2002, the County Council of Talbot County (the “County Council”) adopted Resolution No. 100, which updated the Talbot County Comprehensive Water and Sewer Plan (the “CWSP”) through the 2002 Report of the Review and which identified the Region II – St. Michaels Sewer Service area; and

WHEREAS, the Maryland Department of the Environment (“MDE”) subsequently approved Resolution No. 100 on February 20, 2003; and

WHEREAS, the 1992 Update of the CWSP noted on page 25 in Chapter Two, “Many of the existing village centers have problems with failing septic systems because of the typically small size village center lots, poor soil conditions, and a high groundwater table;” and

WHEREAS, Table 21, Problem Areas – Individual and Community, Talbot County, Maryland in Chapter Four of the 1992 Update of the CWSP listed the village of Fairbank as a Priority #6 for sewer service after Royal Oak/Newcomb, Unionville (Priority #1 – corrected in 1993), Tunis Mills and Copperville (Priority #2 – corrected in 1993), Wittman (Priority #3 – under review), Black Dog Alley/North Easton/Cordova Road/Clearview (Priority #4 – needs sewer from the Easton Wastewater System) and Neavitt (Priority #5 – design underway as part of Resolution 250); and

WHEREAS, Table 21 of Chapter Four of the 1992 Update of the CWSP noted the problem description for Fairbank as “Failing Septic Systems, High Groundwater Table, Small Lots Poorly Drained Soils;” and

WHEREAS, the Groundwater Penetration Report included in the 1992 Update of the CWSP identified the western portion of Talbot County as “Management Area B” consisting of “large areas of poorly drained and slowly permeable soils, such as Othello series, predominate in Area “B”, and indicate the most likely option to be employed, as it has in the past, will be direct groundwater penetration” of septic system drain fields; and

WHEREAS, the geology as presented in the Groundwater Penetration Report for the villages of Bar Neck and Fairbank and the area around these villages is “underlain by the interstratified silts, sands, and clays consists of the Kent Island Formation (Wisconsin or Upper Sangamon)” and Tidal Marsh Deposits (Holocene); and

WHEREAS, the issue of poorly drained soils with high groundwater impacts both the villages of Bar Neck and Fairbank along with the lots around these villages, thus presenting direct penetration of drain fields into the shallow aquifers; and

WHEREAS, the Region V (Tilghman) Wastewater Treatment Plant (the “Region V WWTP”) was constructed in 1986 and consists of a two-cell, stabilization lagoon system that lacks biological nutrient removal (“BNR”) and enhanced nutrient removal (“ENR”) technologies; and

WHEREAS, in 2022, the Region V WWTP discharged an annual average concentration of 17.55 mg/l of total nitrogen (“TN”), 4.17 mg/l of total phosphorus (“TP”), 2,909 pounds of TN, and 572 pounds of TP; and

WHEREAS, the annual limit for TN is 4,406 pounds and the annual limit for TP is 734 pounds; and

WHEREAS, the Talbot County Sanitary District received a planning grant from MDE to prepare a Preliminary Engineering Report (“PER”) to evaluate the construction of a new ENR wastewater treatment plant to be located at the current Region V WWTP or the pumping of wastewater flows to the Region II Wastewater System that was upgraded with ENR technologies in 2008; and

WHEREAS, the Region V WWTP has a wastewater capacity of 150,000 gallons per day (“GPD”); and

WHEREAS, the Region V sewer collection system was installed in the 1980s and consists mostly of gravity sewer pipes that is susceptible to inflow and infiltration (“I&I”) due to high groundwater and low-lying areas; and

WHEREAS, the Region V WWTP Daily Average Flows in GPD for the past five (5) years are presented in Table 1 below as follows:

Table 1 – Region V WWTP Daily Average Flows for each Calendar Year

YEAR	2018	2019	2020	2021	2022
Current Capacity	150,000 GPD	150,000 GPD	150,000 GPD	150,000 GPD	150,000 GPD
Report Daily Average Flow	119,992 GPD	85,510 GPD	117,000 GPD	85,675 GPD	82,513 GPD
Remaining Capacity	30,008 GPD	64,490 GPD	33,000 GPD	64,325 GPD	67,481 GPD

; and

WHEREAS, the three (3) year average for the daily average flows from 2022, 2021, and 2020 was 95,063 GPD; and

WHEREAS, the remaining capacity of the Region V WWTP is 54,937 GPD; and

WHEREAS, the current capacity allocated for infill lots is 7,000 GPD; and

WHEREAS, the Region V Wastewater System serves 674 equivalent dwelling units (“EDUs”) and, based on the three (3) year average, each EDU discharges 141 GPD of wastewater; and

WHEREAS, the total number of lots to be served with sewer within and around the villages of Bar Neck and Fairbank is 127, consisting of improved and unimproved residential lots, as more identified and described in Exhibits A and B attached hereto and incorporated by reference as if fully set forth herein (collectively, the “Properties,” individually, a “Property”); and

WHEREAS, the proposed sewer to the Properties shall consist of a low-pressure sewer system where individual pumps installed in either pump chambers or septic tanks convey the wastewater to the Region V WWTP; and

WHEREAS, the Talbot County Sanitary District received a planning grant from the United States Department of Agriculture – Rural Development (“Rural Development”) to prepare a PER to explore the feasibility of extending sewer to the Properties, which was submitted to Rural Development for final review, with a review meeting being held on February 13, 2023; and

WHEREAS, on April 26, 2022, the County Council adopted Resolution No. 318, an amendment to the 2002 CWSP, adding a new capital project to extend sewer to the Properties at an estimated cost of \$2.19 million; and

WHEREAS, on July 12, 2022, the County Council adopted capital enabling legislation (Bill No. 1502), which authorized the expenditure of \$2.19 million to extend sewer to the Properties, with the proposed debt service to be paid by the owners thereof; and

WHEREAS, on June 27, 2022, MDE approved Resolution No. 318, noting that the County needed to evaluate and manage the capacity of the Region V WWTP to allow for the sewer extension to the original 146 lots, since reduced to 127 lots (i.e., the Properties), that the Talbot County Health Department should provide a letter of support to extend sewer to the lots that are in the Priority Funding Areas (“PFAs”), and that the County will need to request a PFA Exception from the Smart Growth Committee for those lots that are in non-PFAs, as more fully set forth in Exhibit C, attached hereto and incorporated by reference as if fully set forth herein; and

WHEREAS, the project flow rate from the Properties will range from 125 GPD per lot to 250 GPD per lot for a total flow rate between 15,875 GPD to 31,750 GPD; and

WHEREAS, there is sufficient capacity in the Region V WWTP to serve the Properties at the estimated highest flow rate of 250 GPD/lot with an estimated flow of 133,813 GPD being treated at the WWTP if all of the Properties are connected along with the infill lots; and

WHEREAS, the County Engineer has evaluated and confirmed the feasibility of extending public sewer to the properties and requested that the Talbot County Office of Law prepare this amendment to the CWSP to facilitate extension of public sewer to the Properties; and,

WHEREAS, in accordance with the requirements of Md. Code Ann., Envir. § 9-506(a)(1)(i), the proposed CWSP amendment set forth herein has been submitted to the Talbot County Planning Commission (the “Planning Commission”), as well as the Talbot County Public Works Advisory Board, for review for consistency with planning programs for the area; and

WHEREAS, on _____, 2023, the Planning Commission certified that the proposed CWSP amendment set forth herein is consistent with the Comprehensive Plan as required by Md. Code Ann., Envir. § 9-506(a)(1)(ii).

NOW, THEREFORE, BE IT RESOLVED BY THE COUNTY COUNCIL OF TALBOT COUNTY, MARYLAND, that the Talbot County Comprehensive Water and Sewer Plan shall be and is hereby amended as follows:

SECTION ONE: The above recitals are hereby incorporated as if fully set forth herein.

SECTION TWO: Subject to the terms and conditions herein, the CWSP is amended to reclassify and remap the Properties as S-1, immediate priority status for sewer service from the Region V WWTP, as shown on Exhibit A.

SECTION THREE: The proposed use for the Properties shall be for a single-family residence with an allocation of one (1) EDU of sewer capacity for each Property. The peak flow sewer allocation to each Property shall be limited to 250 gallons per day per EDU.

SECTION FOUR: Connection to the force main shall not be used to accommodate further subdivision of the Properties as existing when this Resolution is adopted without further amendment of the CWSP duly approved by the County Council.

SECTION FIVE: The owners of the Properties as identified in Exhibit B (collectively, the "Owners," individually, an "Owner") shall be jointly and severally responsible for contracting and paying for all required permits, easements, construction work, and all benefit and connection charges in accordance with a Public Works Agreement (a "PWA") approved by the County. The PWA shall run with and bind the subject Owner's Property and shall be filed among the Land Records of Talbot County, Maryland within sixty (60) days from the date of approval of the building permit. The PWA may provide for recoupment of a portion of the construction costs from other lots served by the force main that may be authorized to connect to it in the future.

SECTION SIX: Each Owner shall be responsible for paying a connection fee as defined for the Region V Wastewater System before commencing construction to connect their Property to the force main. Such connections shall be subject to periodic charges, tariffs, and policies as may be adopted from time to time.

SECTION SEVEN: Each Owner shall be solely responsible for all costs incurred for design, engineering, construction, inspection, and testing that may be reasonably required, as determined by the County Engineer, to connect their Property to the force main, including, without limitation, any material, pumps, saddles, or other equipment, and for all costs incurred for ongoing maintenance and repair.

SECTION EIGHT: No sewer service shall be available to any area beyond the existing Properties to be served. No other properties, lots, or parcels, including any future reconfiguration or recombination of the Properties, shall be entitled to service or capacity, unless and until the CWSP is amended to permit such service.

SECTION NINE: The design shall be consistent with the design standards for similar projects in the Region II (St. Michaels) and Region V (Tilghman) Sewer Service Areas, shall be subject to review and approval by the County Engineer, and shall include design features, components, and materials as the County Engineer or his designee may reasonably require, including the ability to isolate the connection.

SECTION TEN: Each Owner shall be solely responsible for all remediation, mitigation, damages, charges, fines, penalties, or other costs imposed, levied, or assessed at any time by any federal, State, or local enforcement agency for any environmental damage or violation of law caused by or resulting from that Owner's connection to the force main. The Owners shall indemnify and hold the County harmless from and against all such claims, actions, suits, damages, losses, or expenses, of any kind, nature, or description whatsoever.

SECTION ELEVEN: This Resolution shall not modify, excuse, or supersede any other requirements for ongoing compliance with all applicable federal, State, and local statutes, ordinances, rules, or regulations, including without limitation all conditions and requirements of all permits and approvals necessary for connection to the force main.

SECTION TWELVE: This Resolution shall take effect immediately upon the date of its adoption.

PUBLIC HEARING

Having been posted and Notice, Time and Place of Hearing, and Title of Resolution No. ____ having been published, a public hearing was held on Tuesday, __, 2023 at 6:30 p.m. in the Bradley Meeting Room, South Wing, Talbot County Courthouse, 11 North Washington Street, Easton, Maryland.

BY THE COUNCIL

Read the second time:

Enacted: _____

By Order: _____
Susan W. Moran, Secretary

- Callahan -
- Stepp -
- Leshner -
- Mielke -
- Haythe -

Effective:

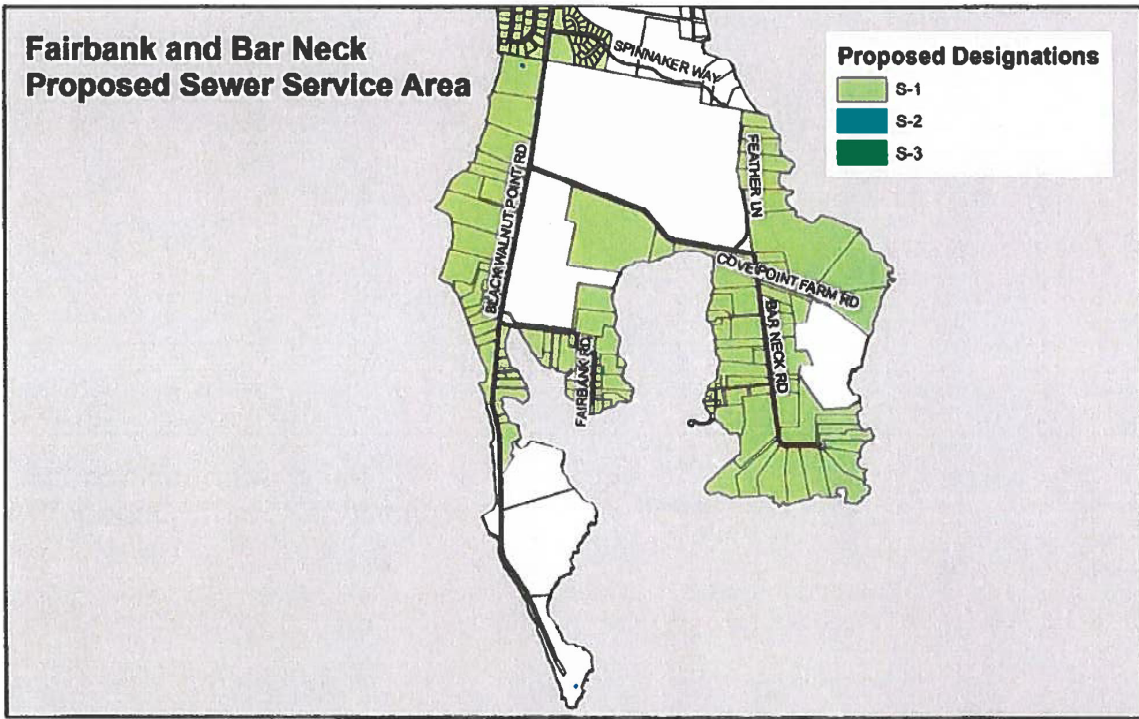
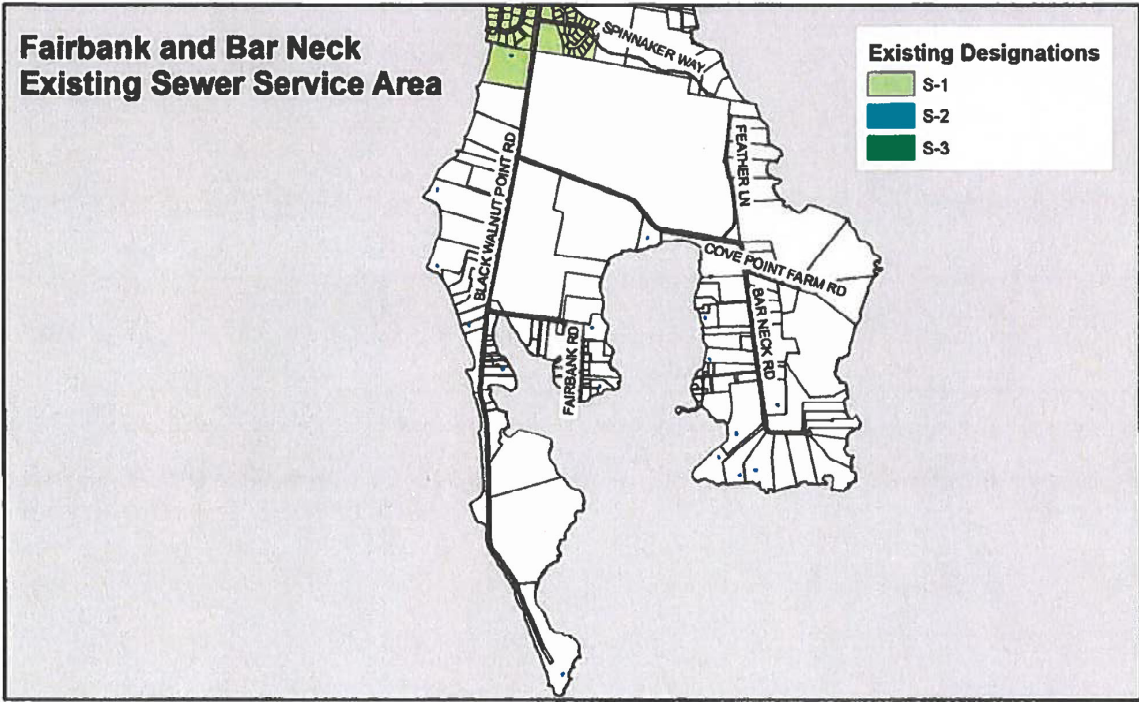


Exhibit A

Talbot County Public Works
February 27, 2023

EXHIBIT B

TALBOT COUNTY
BAR NECK AND FAIRBANK SEWER EXTENSION
February 24, 2023

TABLE NUMBER	ACCTID	MAP	PARCEL	LOT	LOT TYPE	ACRES	STRUCTURE		ADDRESS	CITY
							YEAR BUILT	SQUARE FOOT		
1	2105189683	0051	0004		Residential	1.04	1900	1600	42 BAR NECK DR	TILGHMAN
2	2105191475	0051	0097	3	Residential	5.07	1993	2424	4758 BAR NECK ROAD	TILGHMAN
3	2105191467	0051	0097	2	Residential	6.34	2007	4224	4762 BAR NECK ROAD	TILGHMAN
4	2105191440	0051	0097	1	Residential	5.02	1998	2801	4768 BAR NECK ROAD	TILGHMAN
5	2105189616	0051	0007		Residential	5.53	1920	2886	4774 BAR NECK ROAD	TILGHMAN
6	2105190592	0051	0008		Residential	9.85	1983	2094	4780 BAR NECK ROAD	TILGHMAN
7	2105177391	0051	0076		Residential	4.50	1973	2680	4797 BAR NECK ROAD	TILGHMAN
8	2105182093	0051	0075		Residential	1.93	1920	1630	4855 BAR NECK ROAD	TILGHMAN
9	2105178088	0051	0073		Residential	0.42	1900	1070	4869 BAR NECK ROAD	TILGHMAN
10	2105178096	0051	0061		Residential	0.42	2009	2190	4871 BAR NECK ROAD	TILGHMAN
11	2105186374	0051	0056		Residential	4.00	1947	2762	4876 BAR NECK ROAD	TILGHMAN
12	2105182085	0051	0055		Residential	1.00	1969	2374	4906 BAR NECK ROAD	TILGHMAN
13	2105177995	0051	0054		Residential	3.13	1900	1550	4912 BAR NECK ROAD	TILGHMAN
14	2105182077	0051	0052		Residential	2.00	1900	1218	4918 BAR NECK ROAD	TILGHMAN
15	2105194202	0051	0031	2	Residential	2.00	1999	2440	4957 BAR NECK ROAD	TILGHMAN
16	2105176816	0051	0066		Residential	2.00	1975	2072	4962 BAR NECK ROAD	TILGHMAN
17	2105194210	0051	0031	3	Residential	2.00	2001	1680	4963 BAR NECK ROAD	TILGHMAN
18	2105190630	0051	0096	2	Residential	6.19	2008	2703	4984 BAR NECK ROAD	TILGHMAN
19	2105194296	0051	0031	6	Residential	2.00	1995	1620	5015 BAR NECK ROAD	TILGHMAN
20	2105194342	0051	0031	8	Residential	2.00	2019	3060		TILGHMAN
21	2105176468	0044	0018		Residential	2.72	2016	3848	5090 BAR NECK ROAD	TILGHMAN
22	2105177707	0051	0067		Residential	0.27	1952	916	21550 BAR NECK LANE	TILGHMAN
23	2105186447	0051	0090		Residential	0.44	1900	1602	21554 BAR NECK LANE	TILGHMAN
24	2105185076	0051	0064		Residential	0.59	1910	2228	21577 BAR NECK LANE	TILGHMAN
25	2105185068	0051	0087		Residential	0.17	1900	672	21558 BAR NECK COVE ROAD	TILGHMAN
26	2105178118	0051	0088		Residential	0.40	2001	1814	21562 BAR NECK COVE ROAD	TILGHMAN
27	2105177383	0051	0001		Residential	0.46	1900	1348	21570 BAR NECK COVE ROAD	TILGHMAN
28	2105179726	0051	0058		Residential	0.26	1900	1332	21582 BAR NECK COVE ROAD	TILGHMAN
29	2105181909	0051	0068		Residential	4.30	2002	1369	21587 BAR NECK COVE ROAD	TILGHMAN
30	2105179009	0051	0060		Residential	4.15	1950	1223	21615 BAR NECK COVE ROAD	TILGHMAN

TALBOT COUNTY
BAR NECK AND FAIRBANK SEWER EXTENSION
February 24, 2023

31	2105176247	0051	0013	Residential	3.95	1968	1724	4787 BLACK WALNUT POINT ROAD	TILGHMAN
32	2105175534	0051	0012	Residential	0.46	1995	3025	4799 BLACK WALNUT POINT ROAD	TILGHMAN
33	2105187400	0051	0011	Residential	0.68	1950	1708	4807 BLACK WALNUT POINT ROAD	TILGHMAN
34	2105187516	0051	0010	Residential	2.50	1900	1386	4849 BLACK WALNUT POINT ROAD	TILGHMAN
35	2105185793	0051	0009	Residential	1.60	1950	1704	4851 BLACK WALNUT POINT ROAD	TILGHMAN
36	2105184649	0051	0003	Residential	0.41	1910	1750	4873 BLACK WALNUT POINT ROAD	TILGHMAN
37	2105176093	0051	0006	Residential	0.77	2001	2464	4879 BLACK WALNUT POINT ROAD	TILGHMAN
38	2105184576	0051	0047	Residential	0.30	1989	1056	4883 BLACK WALNUT POINT ROAD	TILGHMAN
39	2105176379	0051	0045	Residential	0.52	1949	1605	4889 BLACK WALNUT POINT ROAD	TILGHMAN
40	2105187435	0051	0025	Residential	0.36	1976	1056	4897 BLACK WALNUT POINT ROAD	TILGHMAN
41	2105178452	0051	0072	Residential	0.20	1950	840	4911 BLACK WALNUT POINT ROAD	TILGHMAN
42	2105195934	0051	0099	Residential	4.02	2014	3061	4926 BLACK WALNUT POINT ROAD	TILGHMAN
43	2105196000	0051	0099	Residential	2.00	2004	3234	4930 BLACK WALNUT POINT ROAD	TILGHMAN
44	2105185459	0051	0022	Residential	1.05	2005	1605	4933 BLACK WALNUT POINT ROAD	TILGHMAN
45	2105195381	0051	0099	Residential	2.00	2003	3395	4958 BLACK WALNUT POINT ROAD	TILGHMAN
46	2105195365	0051	0099	Residential	2.00		0	4962 BLACK WALNUT POINT ROAD	TILGHMAN
47	2105183952	0044	0024	Residential	0.85	1948	952	5008 BLACK WALNUT POINT ROAD	TILGHMAN
48	2105185343	0044	0016	Residential	0.36	1969	2030	5018 BLACK WALNUT POINT ROAD	TILGHMAN
49	2105175607	0044	0022	Residential	8.18	1990	3832	5032 BLACK WALNUT POINT ROAD	TILGHMAN
50	2105182190	0044	0013	Residential	4.57	1900	1544	5116 BLACK WALNUT POINT ROAD	TILGHMAN
51	2105184282	0044	0017	Agricultural	30.63	1990	1792	5125 BLACK WALNUT POINT ROAD	TILGHMAN
52	2105188016	0044	0012	Exempt Comme	1.05	1891	1293	5160 BLACK WALNUT POINT ROAD	TILGHMAN
53	2105188644	0044	0008	Residential	2.85	1995	1792	5174 BLACK WALNUT POINT ROAD	TILGHMAN
54	2105177715	0044	0011	Residential	2.63	1988	3616	5176 BLACK WALNUT POINT ROAD	TILGHMAN
55	2105190894	0044	0036	Residential	10.31		0	5264 BLACK WALNUT POINT ROAD	TILGHMAN
56	2105187133	0051	0080	Residential	0.23	1900	780	21399 BROAD COVE LANE	TILGHMAN
57	2105178568	0051	0024	Residential	2.71	1900	3037	21408 BROAD COVE LANE	TILGHMAN
58	2105177200	0051	0039	Residential	1.91	1910	1680	21415 BROAD COVE LANE	TILGHMAN
59	2105179513	0051	0079	Residential	0.50	1930	903	21417 BROAD COVE LANE	TILGHMAN
60	2105193354	0051	0016	Agricultural	28.53	1999	3276	21710 COVE POINT FARM ROAD	TILGHMAN
61	2105194253	0051	0031	Residential	2.00	2003	2744	21711 COVE POINT FARM ROAD	TILGHMAN
62	2105193338	0051	0016	Residential	14.78	2003	4771	21720 COVE POINT FARM ROAD	TILGHMAN
63	2105193362	0051	0016	Agricultural	9.38	1996	2520	21730 COVE POINT FARM ROAD	TILGHMAN

TALBOT COUNTY
BAR NECK AND FAIRBANK SEWER EXTENSION
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64	2105183316	0051	0050	Residential	0.67	1900	1392	4815 FAIRBANK ROAD	TILGHMAN
65	2105176808	0051	0036	Residential	0.90	1912	2809	4832 FAIRBANK ROAD	TILGHMAN
66	2105181747	0051	0035	Residential	0.33	1890	1508	4836 FAIRBANK ROAD	TILGHMAN
67	2105184231	0051	0044	Residential	0.17	1900	1516	4839 FAIRBANK ROAD	TILGHMAN
68	2105185130	0051	0026	Residential	0.39	1900	3206	4846 FAIRBANK ROAD	TILGHMAN
69	2105182115	0051	0043	Residential	1.10	1890	2588	4847 FAIRBANK ROAD	TILGHMAN
70	2105177782	0051	0042	Residential	0.27	1890	1534	4849 FAIRBANK ROAD	TILGHMAN
71	2105176026	0051	0041	Residential	0.39	1900	1320	4861 FAIRBANK ROAD	TILGHMAN
72	2105180732	0051	0040	Residential	0.33	1939	750	4871 FAIRBANK ROAD	TILGHMAN
73	2105187672	0051	0048	Residential	2.03	1980	1882	4883 FAIRBANK ROAD	TILGHMAN
74	2105175844	0051	0081	Residential	0.18	1956	1440	4885 FAIRBANK ROAD	TILGHMAN
75	2105185653	0051	0023	Residential	0.50	1900	1724	4905 FAIRBANK ROAD	TILGHMAN
76	2105185661	0051	0027	Residential	0.62	1982	1056	4906 FAIRBANK ROAD	TILGHMAN
77	2105177138	0051	0086	Residential	0.19	1884	1632	4909 FAIRBANK ROAD	TILGHMAN
78	2105181577	0051	0094	Residential	1.00	1900	2246	4917 FAIRBANK ROAD	TILGHMAN
79	2105176050	0051	0020	Residential	0.42	1946	1419	4932 FAIRBANK ROAD	TILGHMAN
80	2105178614	0051	0021	Residential	3.20	1861	2875	4934 FAIRBANK ROAD	TILGHMAN
81	2105179467	0051	0019	Residential	1.72	1911	1793	4936 FAIRBANK ROAD	TILGHMAN
82	2105184614	0051	0002	Residential	0.91	1968	3788	4938 FAIRBANK ROAD	TILGHMAN
83	2105175232	0051	0018	Residential	0.72	1959	1260	4940 FAIRBANK ROAD	TILGHMAN
84	2105178134	0051	0017	Residential	2.57	1900	3300	4944 FAIRBANK ROAD	TILGHMAN
85	2105182158	0051	0034	Residential	0.48	1950	1799	21353 FAIRBANK CIR	TILGHMAN
86	2105181461	0051	0033	Residential	0.81	1900	2984	21356 FAIRBANK CIR	TILGHMAN
87	2105186617	0051	0032	Residential	0.74	2004	2312	21364 FAIRBANK CIR	TILGHMAN
88	2105177545	0051	0029	Residential	0.44	1900	3552	21368 FAIRBANK CIR	TILGHMAN
89	2105176891	0051	0028	Residential	0.93	1900	1720	21380 FAIRBANK CIR	TILGHMAN
90	2105193974	0044	0026	Residential	5.67	1999	2852	5141 FEATHER LANE	TILGHMAN
91	2105193966	0044	0026	Residential	5.84	2002	1890	5171 FEATHER LANE	TILGHMAN
92	2105193923	0044	0026	Residential	2.41	2006	3160	5241 FEATHER LANE	TILGHMAN
93	2105193915	0044	0026	Residential	2.40	1998	3032	5261 FEATHER LANE	TILGHMAN
94	2105195438	0051	0099	Residential	2.00		0	21207 HICKORY LANE	TILGHMAN
95	2105195411	0051	0099	Residential	2.00		0	21211 HICKORY LANE	TILGHMAN
96	2105195403	0051	0099	Residential	2.00		0	21239 HICKORY LANE	TILGHMAN

TALBOT COUNTY
BAR NECK AND FAIRBANK SEWER EXTENSION
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97	2105180252	0051	0049		Residential	0.39	1900	1960	21409 WALNUT COVE LANE	TILGHMAN
98	2105185521	0051	0030		Residential	0.99	1900	1440	21415 WALNUT COVE LANE	TILGHMAN
99	2105193931	0044	0026	3	Residential	2.91		0		TILGHMAN
100	2105188466	0051	0097	7	Residential	2.06		0		TILGHMAN
101	2105191483	0051	0097	4	Residential	4.92		0		TILGHMAN
102	2105191491	0051	0097	5	Residential	7.33		0		TILGHMAN
103	2105191505	0051	0097	6	Residential	4.21		0		TILGHMAN
104	2105195284	0051	0097	8	Residential	2.20		0		TILGHMAN
105	2105195314	0051	0097	10	Residential	2.25		0		TILGHMAN
106	2105195322	0051	0097	9	Residential	2.10		0		TILGHMAN
107	2105195349	0051	0097	11	Residential	9.35		0		TILGHMAN
108	2105190908	0044	0036	3	Residential	10.00		0		TILGHMAN
109	2105190843	0051	0059		Residential	0.25		0		TILGHMAN
110	2105190622	0051	0096	1	Residential	7.46		0		TILGHMAN
111	2105177103	0051	0071		Residential	6.14	1973	928		TILGHMAN
112	2105177111	0051	0070		Residential	1.00	1930	1516		TILGHMAN
113	2105194245	0051	0031	4	Residential	2.00		0		TILGHMAN
114	2105194318	0051	0031	7	Residential	2.00		0		TILGHMAN
115	2105182174	0051	0037		Residential	0.18		0		TILGHMAN
116	2105182441	0051	0005		Residential	0.81		0		TILGHMAN
117	2105175291	0044	0014		Residential	11.73	1953	1761		TILGHMAN
118	2105180678	0044	0015		Residential	8.59		0		TILGHMAN
119	2105190649	0051	0096	3	Residential	6.45		0		TILGHMAN
120	2105175615	0051	0063		Residential	0.45		0		TILGHMAN
121	2105195489	0044	0042	2	Residential	4.28		0		TILGHMAN
122	2105198313	0044	0017	3	Agricultural	5.00		0		TILGHMAN
123	2105198321	0044	0017	2	Agricultural	5.00		0		TILGHMAN
124	2105193958	0044	0026	4	Residential	3.83		0		TILGHMAN
125	2105187956	0051	0095		Exempt	0.25		0		TILGHMAN
126	2105194172	0051	0031	1	Residential	2.00		0		TILGHMAN
127	2105182263	0051	0093		Residential	0.14	1900	1366		TILGHMAN

EXHIBIT C



Maryland
Department of
the Environment

Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor
Horacio Tablada, Secretary
Suzanne E. Dorsey, Deputy Secretary

June 27, 2022

The Honorable Chuck F. Callahan
Council President
County Council of Talbot County
11 North Washington Street
Easton, Maryland 21601

Dear Council President Callahan:

The Maryland Department of the Environment (MDE) has completed its review of the **Talbot County Capital Improvement Projects (Amendment) through Resolutions 315, 316, 317, 318, 319, 320 and 321** to the 2002 Talbot County Comprehensive Water and Sewer Plan (CWSP). The Talbot County Council adopted the Amendments on April 26, 2022. The amendments propose adding seven (7) capital projects for the improvements across the County, as listed as below:

- **Resolution 315**
 - Adding a new Capital Project in the Amount of \$8.6 Million for the purpose of replacing the town of Easton's Glebe Water Treatment Plant (WTP) with upgraded technology
- **Resolution 316**
 - Adding a new Capital Project in the Amount of \$800,000 for force main pressure sensors and vacuum sensors for the Region I Sewer Service Areas
- **Resolution 317**
 - Adding a new Capital Project for a new emergency generator for the Region II Water System
- **Resolution 318**
 - Adding a new Capital Project in the Amount of \$2.19 Million to Eliminate septic systems in the villages of Bar Neck and Fairbank by expanding sewer service from the Region V Wastewater System for up to 146 residential properties
- **Resolution 319**
 - Adding a new Capital Project in the Amount of \$43,688,300 for the Region V Wastewater System and eliminating septic systems in around the villages of Sherwood, Wittman, McDaniel and Claiborne by extending the sewer from Region V to Region II WWTP and reconstruction of Region II WWTP with expanding the design capacity of Region II
- **Resolution 320**
 - Adding a new Capital Project in the Amount of \$800,000 for individual grinder pumps in Region I

The Honorable Chuck F. Callahan
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- **Resolution 321**

- Adding a new Capital Project in the Amount of \$1.5 Million for sewer collection system improvements for the Region V sanitary district

Maryland Department of Planning Findings

The Maryland Department of Planning (MDP) advised MDE that these are atypical of WSP amendment reviews in that it merely revises an existing table within the adopted Talbot County WSP to add a Capital Improvement project. Therefore, this amendment does not lend itself to consideration of consistency. MDP supports all the amendments, which are in furtherance of public health, safety, and welfare of the County. For further information please see attached MDP comments and MDP contact information.

MDE Findings and Action

The County did not provide draft amendments of these Resolutions with enough time to thoroughly review and get comments from all the state reviewers. However, MDE sent preliminary comments, via email on April 11, 2022. The preliminary comments indicated MDE's concerns and requested additional information for Resolutions 315, 318 and 319. The comments and questions are enclosed. Final comments on the drafts were sent to the County on May 11, 2022.

Upon MDE's receipt of the adopted Amendments, none of the comments were addressed, and none of the requested information was provided. It was also noted that the County needs to take into consideration the time needed for MDE to review draft amendments prior to the adoption by the Council. MDE will need approximately 60 days to review draft amendments.

Resolution 315

During review of the draft Resolution, MDE requested clarification if there would be changes to the new WTP hydraulic capacity. No information regarding any change to the capacity was received. The new Easton's Glebe WTP capacity is limited to the current capacity.

Resolution 318

- The properties to be connected to sewer were not identified in the Resolution, either with maps or a list. MDE notes that any final approval of this Resolution will not constitute approval of the project beyond its inclusion for planning and updating purposes. A separate amendment will need to be submitted to MDE, reviewed and approved before continuing with any sewer reclassifications and the designation of new sewer service areas.
- The additional 146 residential properties proposed to be connected to public sewer will contribute 36,500 gallons per day (estimated at 250 gallons per equivalent dwelling unit) to the Region V (WWTP). The WWTP's current permitted design capacity is 150,000 gallons per day (gpd) and the facility's last 3 year average flow is 95,200 gpd. With this additional flow, the capacity used will

The Honorable Chuck F. Callahan
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be approximately 88%. Moving forward, the County should evaluate the WWTP capacity based on MDE's guidelines (Wastewater Capacity Management Plans) and submit the report for MDE approval before any new connections to "Unprogrammed" or no planned sewer service areas can be made. The County is encouraged to contact MDE for information and guidance regarding any potential future WWTP expansion and funding. For the Wastewater Permits, contact the Wastewater Pollution Prevention and Reclamation Program at (410) 537-3599. For potential funding, the Water Quality Financing Administration can be contacted at (410) 537-3119. For information regarding potential future WWTP expansion, MDE's Engineering and Capital Projects Program can be reached at (410) 537-3445.

- MDE notes that there is a separate proposal to connect the Region V plant to Region II plant. The new and expanded Region II WWTP should be constructed before the construction of the conveyance from Region V.
- MDE advises the county to submit a draft amendment for any project regarding the connection of septs to Region V prior to any submission to the County Council with at least 60 days before the County's Public Hearing and Adoption.

Resolution 319

- The properties to be connected to the sewer system were not identified in the Resolution either with maps or a list. Any final approval of this resolution will not constitute approval of the project beyond its inclusion for planning and updating purposes. A separate amendment will still need to be submitted to MDE, reviewed and approved before continuing with any sewer reclassifications and the designation of the new sewer service areas.
- Expansion of Region II, would require the updating Region II text information in the CWSP with the proposed expansion capacity and the Table of Capital Improvement projects. The new and expanded WWTP should be constructed before the construction of the extension to any new sewer service area as much of the existing WWTP capacity has been allocated to connect other properties via past Resolutions.
- MDE advises the county to submit a draft amendment for any project regarding the connection of Region II and the expansion of Region II prior to any submission to the County Council with at least 60 days before the County's Public Hearing and Adoption.

Septic Elimination due to public health concerns

- If all areas to be connected are within the PFA, the Health Department should be consulted and a letter of support should be included.
- If any areas are non-PFA, a PFA Exception will need to be requested and granted by the Smart Growth Coordinating Committee. The properties that are

The Honorable Chuck F. Callahan
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failing should be identified and a financial analysis for the remaining properties and any vacant properties that could now be developed and connected should be provided. The Health Department should be consulted, and a letter should be provided that indicates the number of failing properties and support of the non-failing to connect. It should state there is a public health and safety issue (i.e. the failing system) and State funds are needed to address the issue, and reasons it cannot be replaced with a new septic system.

General Comments

- Submission of the Resolutions, which include connections to water or sewer systems or reclassifications of properties, should be accompanied with either maps or a list of the properties connecting to the system.
- Submission of Resolutions that propose changes to the Plan text should include the text that is proposed to change.
- Proposals of expansions of wastewater treatment plant capacity and subsequent discharge may entail review for possible as there could be closures or expanded closures of Shellfish Harvesting waters.

Wetland and Waterways Comments

The Wetland and Waterways Program made the following observations/comments on the amendments 315, 318, 319 and 321:

- There may be wetland or waterway impacts associated with the projects. Impacts will be reviewed by MDE during permit application review. Pre-application meetings are also available to discuss avoidance, minimization, and restoration after temporary impacts.
- Early coordination with the Program during planning stages for the projects is strongly encouraged to avoid or minimize adverse impacts from regulated activities. If there are activities proposed for new sewer or water projects in regulated resources, the County is encouraged to contact the Wetlands and Waterways Program.

Please be reminded that the Talbot County Comprehensive Water and Sewer Plan update is overdue. Code of Maryland Regulations requires that the County provide a copy of the draft Water and Sewer Plan (WSP) to MDE prior to County adoption. This action ensures that MDE's comments can be incorporated, as appropriate, in the County's final WSP.

In accordance with §9-507(a) of the Environment Article, Annotated Code of Maryland, the Department hereby **approves** the Amendments for **Talbot County Capital Improvement Projects - Resolutions 315, 316, 317, 318, 319, 320 and 321.**

The Honorable Chuck F. Callahan
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This action completes MDE's review, as required by §9-507 of the Environment Article, Annotated Code of Maryland. If you need further assistance on these matters, please contact Heather Barthel, Deputy Director, at (410) 537-3512, toll free at (800) 633-6101, or by e-mail at heather.barthel@maryland.gov.

Sincerely,



D. Lee Currey, Director
Water and Science Administration

Enclosures

cc: Raymond P. Clarke, P.E. County Engineer, Talbot County Department of Public Works
Mary Kay Verdery, Planning Director, Talbot County Office of Planning and Zoning
Anne F. Morse, Director, Office of Environmental Health, Talbot County Health Department
Charles Boyd, Director, Planning Coordination, MDP
Heather Barthel, Deputy Director, Water and Science Administration, MDE
Walid Saffouri, Program Administrator, ECPP, OB, MDE

The Honorable Chuck F. Callahan
Page 6

DRAFT Talbot Capital Improvement Projects
MDE Comments
05/05/2022

DISCLAIMER: Below are MDE's Comments on the Capital Improvement Projects, additional comments may be sent under a separate cover.

- MDE comments are as follows:
 - Resolution 315
 - Please indicate what the new Treatment Plant Hydraulic Capacity will be
 - Resolution 318
 - Please be aware that any final MDE approval of Resolution 318 will not constitute approval of the project beyond its inclusion for planning and updating purposes. A separate amendment will still need to be submitted, reviewed and approved before continuing with the designation of new sewer service areas.
 - Please provide maps/lists of any properties that are intended to be part of this new sewer service area. The maps should be clear about the service areas, both existing and what is proposed to be connected.
 - MDE advises the county to submit a draft amendment for any project regarding the connection of septic to Region V prior any submission to County Council with enough time (at least 60 days) before the County's Public Hearing and Adoption.
 - The W&S Plan should be updated to include this as a text change and map change prior to any funding request.
 - If the areas to be connected for Septic Elimination due to public health concerns:
 - If all areas to be connected are all within the PFA: The Health Department should be consulted and a letter of support should be included.
 - If any areas are non-PFA: A PFA will need to be requested and granted by the Smart Growth Coordinating Committee. The properties that are failing should be identified and a financial analysis for the remaining properties and any vacant properties that could now develop and connect should be provided. The Health Department should be consulted and a letter should be provided that indicates the number of failing properties and support of the non-failing to connect. It should state there is a public health and safety issue (i.e. the failing system) and State funds are needed to address the issue, and reasons it cannot be replaced with a new septic system.
 - Resolution 319
 - Any final MDE approval of Resolution 319 will not constitute approval of the project beyond its inclusion for planning and updating purposes. A separate amendment will still need to be submitted, reviewed and approved before continuing with the designation of new sewer service areas, expansion of Region II, which would mean updating Region II text information and proposed expansion capacity, and the table with the construction of the project.
 - Please include maps/lists of any properties that are intended to be included in the new sewer service area.

The Honorable Chuck F. Callahan
Page 7

DRAFT Talbot Capital Improvement Projects
MDE Comments
05/05/2022

- MDE advises the County to submit Draft Amendments for any project regarding the connection of Region V and the expansion of Region II WWTP prior to any submission to County Council with enough time (at least 60 days) before the County's Public Hearing and Adoption
- The W&S Plan should be updated to include this as a text change and map change prior to any funding request. The maps should be clear about the service areas, both existing and what is proposed to be connected.
- If the areas to be connected for Septic Elimination due to public health concerns:
 - If all areas to be connected are all within the PFA: The Health Department should be consulted and a letter of support should be included.
 - If any areas are non-PFA: A PFA will need to be requested and granted by the Smart Growth Coordinating Committee. The properties that are failing should be identified and a financial analysis for the remaining properties and any vacant properties that could now develop and connect should be provided. The Health Department should be consulted and a letter should be provided that indicates the number of failing properties and support of the non-failing to connect. It should state there is a public health and safety issue (i.e. the failing system) and State funds are needed to address the issue, and reasons it cannot be replaced with a new septic system.
- Resolution 321
 - Please confirm the number of lots that might be enabled by this resolution through examining the deeds
 - Please confirm the amount of residences that will be built on the property
- Wetland and Waterways Program had the following comments on the amendments 315, 318, 319, and 321:
 - The amendments mentions new extensions for water and sewer lines, storage facilities, and/or treatment plants. Where practicable, locations of the utility lines and facilities should support protection measures from future development in wetlands, waterways, or floodplains, as well as avoiding and minimizing impacts from the line, treatment facility, and supporting utility infrastructure. Suggested for consideration include:
 - a prohibition on new subdivision lots in wetlands;
 - avoidance and minimization requirements;
 - site plan considerations over multiple parcels that provide for contiguous wetland and stream corridors to be maintained, with minimum fragmentation from roads, buildings, or other structures; and
 - location of new or replacement lines in existing utility or road rights-of-way
 - There may be wetland or waterway impacts associated with the project. Impacts will be reviewed by MDE during application review. Pre-application meetings are also available to discuss avoidance, minimization, and restoration after temporary impacts.

**The Honorable Chuck F. Callahan
Page 8**

**DRAFT Talbot Capital Improvement Projects
MDE Comments
05/05/2022**

- **MDP comments on the Resolution 318 amendment are as follows:**
 - **Planning notes this draft amendment is atypical of WSP amendment reviews in that it merely revises an existing table within the adopted Talbot County WSP to add a Capital Improvements project. Therefore, this draft amendment does not lend itself to consideration of consistency with the county comprehensive plan, or the adopted growth tier map until such time as the project is proposed for implementation.**
- **Please see attached documents for full comments**

Larry Hogan, Governor
Boyd Rutherford, Lt. Governor



Robert S. McCord, Secretary
Sandy Schrader, Deputy Secretary

Maryland DEPARTMENT OF PLANNING

June 2, 2022

Ms. Dinorah Dalmasy, Manager, Integrated Water Planning Program Maryland
Department of the Environment
Water and Science Administration
1800 Washington Boulevard
Baltimore, MD 21230

RE: Talbot County Resolution 317—amendment to revise tables 13 and 20 (capital improvement projects) of the WSP

Dear Ms. Dalmasy:

The Maryland Department of Planning (Planning) has reviewed the referenced Talbot County Water and Sewer Plan (WSP) amendment pursuant to our mandate to advise the Maryland Department of the Environment (MDE) on local comprehensive plan consistency and other appropriate matters as required by Environment Article Section 9-507 (b)(2).

Planning notes that the adopted WSP resolution 317 (and supplemental amendment material) is identical to the previously reviewed draft amendment. Planning had no adverse comments for the draft review; those comments are provided below.

Summary of the Water and Sewer Amendment Request:

This amendment adds a capital project (for fiscal years 2023 and 2024) of \$360,000 for a new emergency generator for the Region II – Martingham sewer service area and Martingham water system. To reflect this capital project the following WSP tables are proposed to be amended:

Table 13. Martingham Water System
Capital Improvement Projects
Table 20. Martingham Sewerage System
Capital Improvement Projects

Planning Matters:

Planning notes this amendment is atypical of WSP amendment reviews in that it merely revises the text within existing tables within the adopted Talbot County WSP. Therefore, this amendment does not lend itself to consideration of consistency with the county comprehensive plan. Planning supports this amendment, which is in furtherance of public health, safety, and welfare by improving the continued operation of the Martingham water and sewerage systems during emergency conditions.

Maryland Department of Planning • 301 West Preston Street, Suite 1101 • Baltimore • Maryland • 21201

Tel: 410.767.4500 • Toll Free: 1.877.767.6272 • TTY users: Maryland Relay • Planning.Maryland.gov

Ms. Dinorah Dalmasy
RE: Talbot County—Resolution 317

June 2, 2022
Page 2

If you have any questions or concerns regarding these comments, please contact Keith Lackie at 410-713-3464, or keith.lackie@maryland.gov.

Sincerely,



Charles W. Boyd, AICP
Director of Planning Coordination

cc: Robin Pellicano; Nicholai Francis-Lau; Steve Alfaro; and Hannah C. Benzion, MDE
Tony Redman, DNR; Dwight Dotterer, MDA
Joseph Griffiths; Tracey Gordy; Jason Dubow; Keith Lackie; Sylvia Mosser; and Cassandra Malloy, Planning

Larry Hogan, Governor
Boyd Rutherford, Lt. Governor



Robert S. McCord, Secretary
Sandy Schrader, Deputy Secretary

Maryland DEPARTMENT OF PLANNING

June 2, 2022

Ms. Dinorah Dalmasy, Manager, Integrated Water Planning Program Maryland
Department of the Environment
Water and Science Administration
1800 Washington Boulevard
Baltimore, MD 21230

RE: Talbot County Resolution 319—amendment to revise table 27 of the WSP

Dear Ms. Dalmasy:

The Maryland Department of Planning (Planning) has reviewed the referenced Talbot County Water and Sewer Plan (WSP) amendment pursuant to our mandate to advise the Maryland Department of the Environment (MDE) on local comprehensive plan consistency and other appropriate matters as required by Environment Article Section 9-507 (b)(2).

Planning notes that the adopted WSP resolution 319 (and supplemental amendment material) is identical to the previously reviewed draft amendment. Planning had no adverse comments for the draft review; those comments are provided below.

Summary of the Sewer Amendment Request:

This amendment adds to the WSP "Table 27. Talbot County Region V (Tilghman) Sanitary District - Capital Improvement Projects" (for fiscal years 2023 and 2024) a new capital project in the amount of \$43,688,300 for the purpose of an ENR upgrade to the Region V (Tilghman) WWTP to eliminate septic systems in and around the villages of Sherwood, Wittman, McDaniel, and Claiborne by extending sewer from the Region V (Tilghman) wastewater system.

Planning Matters:

Planning notes this amendment is atypical of WSP amendment reviews in that it merely revises an existing table within the adopted Talbot County WSP to add a Capital Improvements project. Therefore, this amendment does not lend itself to consideration of consistency with the county comprehensive plan, or the adopted growth tier map until such time as the project is proposed for implementation. Planning notes that this capital project is in furtherance of the 2018 Talbot County WSP amendment (Resolution 250), to provide for the extension of public sewer service to properties identified as Tier III-B -Water Quality Strategy Areas or Tier III-C -Areas of Limited Sewer Service in the Talbot County comprehensive plan. Planning noted in our February 28, 2018 letter to MDE regarding Resolution 250 that reclassifying areas for sewer service with a Community Character land use designation in the Talbot County Comprehensive Plan, which the villages of Sherwood, Wittman, McDaniel, and Claiborne are designated, appears to be consistent with the Comprehensive Plan.

Maryland Department of Planning • 301 West Preston Street, Suite 1101 • Baltimore • Maryland • 21201

Tel: 410.767.4500 • Toll Free: 1.877.767.6272 • TTY users: Maryland Relay • Planning.Maryland.gov

Ms. Dinorah Dalmasy
RE: Talbot County—Resolution 319

June 2, 2022
Page 2

If you have any questions or concerns regarding these comments, please contact Keith Lackie at 410-713-3464, or keith.lackie@maryland.gov.

Sincerely,


Charles W. Boyd, AICP
Director of Planning Coordination

cc: Robin Pellicano; Nicholai Francis-Lau; Steve Alfaro; and Hannah C. Benzion, MDE
Tony Redman, DNR
Dwight Dotterer, MDA
Joseph Griffiths; Tracey Gordy; Jason Dubow; Keith Lackie; Sylvia Mosser; and Cassandra Malloy, Planning

Larry Hogan, Governor
Boyd Rutherford, Lt. Governor



Robert S. McCord, Secretary
Sandy Schrader, Deputy Secretary

Maryland DEPARTMENT OF PLANNING

June 2, 2022

Ms. Dinorah Dalmasy, Manager, Integrated Water Planning Program Maryland
Department of the Environment
Water and Science Administration 1800
Washington Boulevard
Baltimore, MD 21230

RE: Talbot County Resolution 320—amendment to revise table 23 of the WSP

Dear Ms. Dalmasy:

The Maryland Department of Planning (Planning) has reviewed the referenced Talbot County Water and Sewer Plan (WSP) amendment pursuant to our mandate to advise the Maryland Department of the Environment (MDE) on local comprehensive plan consistency and other appropriate matters as required by Environment Article Section 9-507 (b)(2).

Planning notes that the adopted WSP resolution 320 (and supplemental amendment material) is identical to the previously reviewed draft amendment. Planning had no adverse comments for the draft review; those comments are provided below.

Summary of the Sewer Amendment Request:

This amendment adds to the WSP "Table 23. Talbot County Region I (Unionville, Tunis Mills, Copperville) Sanitary District - Capital Improvement Projects" (for fiscal years 2023 and 2024) a new capital project in the amount of \$800,000 for individual grinder pumps in the Region 1 (Unionville, Tunis Mills, Copperville) sewer service area. More specifically, this capital project will replace all E-One Series 200 and 2000 Grinder Pumps with E-One Extreme Grinder Pumps.

Planning Matters:

Planning notes this amendment is atypical of WSP amendment reviews in that it merely revises an existing table within the adopted Talbot County WSP to add a Capital Improvement project. Therefore, this amendment does not lend itself to consideration of consistency with the county comprehensive plan until such time as the project is implemented. Planning notes that this capital project is in furtherance of public health, safety, and welfare by improving the existing sewer Region 1 service system.

If you have any questions or concerns regarding these comments, please contact Keith Lackie at 410-713-3464, or keith.lackie@maryland.gov.

Sincerely,

Charles W. Boyd, AICP
Director of Planning Coordination

cc: Robin Pellicano; Nicholai Francis-Lau; Steve Alfaro; and Hannah C. Benzion, MDE Tony Redman, DNR
Dwight Dotterer, MDA
Joseph Griffiths; Tracey Gordy; Jason Dubow; Keith Lackie; Sylvia Mosser; and Cassandra Malloy, Planning

Maryland Department of Planning • 301 West Preston Street, Suite 1101 • Baltimore • Maryland • 21201

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Larry Hogan, Governor
Boyd Rutherford, Lt. Governor



Robert S. McCord, Secretary
Sandy Schrader, Deputy Secretary

Maryland DEPARTMENT OF PLANNING

June 2, 2022

Ms. Dinorah Dalmasy, Manager, Integrated Water Planning Program Maryland
Department of the Environment
Water and Science Administration 1800
Washington Boulevard
Baltimore, MD 21230

RE: Talbot County Resolution 321—amendment to revise table 27 of the WSP

Dear Ms. Dalmasy:

The Maryland Department of Planning (Planning) has reviewed the referenced Talbot County Water and Sewer Plan (WSP) amendment pursuant to our mandate to advise the Maryland Department of the Environment (MDE) on local comprehensive plan consistency and other appropriate matters as required by Environment Article Section 9-507 (b)(2).

Planning notes that the adopted WSP resolution 321 (and supplemental amendment material) is identical to the previously reviewed draft amendment. Planning had no adverse comments for the draft review; those comments are provided below.

Summary of the Sewer Amendment Request:

This amendment adds to the WSP "Table 27. Talbot County Region V (Tilghman) Sanitary District - Capital Improvement Projects" (for fiscal years 2023 and 2024) a new capital project in the amount of \$1.5 million for the purpose of sewer collection system improvements for the Region V (Tilghman) sanitary district. More specifically, this project will rehabilitate and replace gravity sewer lines in the Region V sanitary district and upgrade sewer manholes and manhole frames and covers to make the system more watertight.

Planning Matters:

Planning notes this amendment is atypical of WSP amendment reviews in that it merely revises an existing table to add a Capital Improvement project to rehabilitate and upgrade the existing Tilghman sewer collection system within the adopted Talbot County WSP. Therefore, this amendment does not lend itself to consideration of consistency with the county comprehensive plan. Planning notes that this capital project is in furtherance of public health, safety, and welfare by improving the existing sewer service system.

If you have any questions or concerns regarding these comments, please contact Keith Lackie at 410-713-3464, or keith.lackie@maryland.gov.

Sincerely,

Charles W. Boyd, AICP
Director of Planning Coordination

cc: Robin Pellicano; Nicholai Francis-Lau; Steve Alfaro; and Hannah C. Benzion, MDE
Tony Redman, DNR
Dwight Dotterer, MDA
Joseph Griffiths; Tracey Gordy; Jason Dubow; Keith Lackie; Sylvia Mosser; and Cassandra Malloy, Planning

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Larry Hogan, Governor
Boyd Rutherford, Lt. Governor



Robert S. McCord, Secretary
Sandy Schrader, Deputy Secretary

Maryland DEPARTMENT OF PLANNING

June 2, 2022

Ms. Dinorah Dalmasy, Manager, Integrated Water Planning Program Maryland Department
of the Environment
Water and Science Administration 1800
Washington Boulevard
Baltimore, MD 21230

RE: Talbot County Resolution 315—amendment to revise “Table 7 – Easton Water System Capital
Improvement Projects” of WSP

Dear Ms. Dalmasy:

The Maryland Department of Planning (Planning) has reviewed the referenced Talbot County Water and Sewer Plan (WSP) amendment pursuant to our mandate to advise the Maryland Department of the Environment (MDE) on local comprehensive plan consistency and other appropriate matters as required by Environment Article Section 9-507 (b)(2).

Planning notes that the adopted WSP resolution 315 (and supplemental amendment material) is identical to the previously reviewed draft amendment. Planning had no adverse comments for the draft review; those comments are provided below.

Summary of the Water Amendment Request:

This amendment amends the Talbot County WSP, to add to “Table 7 – Easton Water System Capital Improvement Projects” (for fiscal years 2023 and 2024) a new capital project in the amount of \$8.6 million for the purpose of replacing the Town of Easton’s Glebe water treatment plant with upgraded technology.

Planning Matters:

Planning notes this amendment is atypical of WSP amendment reviews in that it merely revises an existing table within the adopted Talbot County WSP to add a Capital Improvement project. Therefore, this amendment does not lend itself to consideration of consistency with the Town of Easton comprehensive plan until such time as the project is implemented. Planning supports this amendment, which will provide improved drinking water to 1,632 commercial properties and 6,877 residential properties and serve an estimated 9,000 equivalent dwelling units (EDUs).

If you have any questions or concerns regarding these comments, please contact Keith Lackie at 410-713-3464, or keith.lackie@maryland.gov.

Sincerely,

Charles W. Boyd, AICP
Director of Planning Coordination

cc: Robin Pellicano; Nicholai Francis-Lau; Steve Alfaro; and Hannah C. Benzion, MDE
Tony Redman, DNR
Dwight Dotterer, MDA
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Larry Hogan, Governor
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Robert S. McCord, Secretary
Sandy Schrader, Deputy Secretary

Maryland DEPARTMENT OF PLANNING

June 2, 2022

Ms. Dinorah Dalmasy, Manager, Integrated Water Planning Program Maryland
Department of the Environment
Water and Science Administration
1800 Washington Boulevard
Baltimore, MD 21230

RE: Talbot County Resolution 316—amendment to revise Tables 20, 23, and 25 (capital improvement projects) of the WSP

Dear Ms. Dalmasy:

The Maryland Department of Planning (Planning) has reviewed the referenced Talbot County Water and Sewer Plan (WSP) amendment pursuant to our mandate to advise the Maryland Department of the Environment (MDE) on local comprehensive plan consistency and other appropriate matters as required by Environment Article Section 9-507 (b)(2).

Planning notes that the adopted WSP resolution 316 (and supplemental amendment material) is identical to the previously reviewed draft amendment. Planning had no adverse comments for the draft review; those comments are provided below.

Summary of the Sewer Amendment Request:

This amendment adds a capital project (for fiscal years 2023 and 2024) for \$800,000 to install sensors in the force mains from the Unionville pump station to the Royal Oak pump station #1, to a sanitary sewer manhole on Madison Avenue in St. Michaels, and in the Martingham vacuum collection system. To reflect this capital project, the following WSP tables are proposed to be amended:

Table 20. Martingham Sewerage System
Capital Improvement Projects

Table 23. Talbot County Region I Sanitary District (Unionville, Tunis Mills, Copperville)
Capital Improvement Projects

Table 25. Talbot County Region II Sanitary District (Royal Oak, Newcomb, Bellevue)
Capital Improvement Projects

Planning Matters:

Planning notes this amendment is atypical of WSP amendment reviews in that it merely revises existing text to include capital improvement projects within three tables of the adopted Talbot County WSP. Therefore, this draft amendment does not lend itself to consideration of consistency with the county comprehensive plan. Planning supports this amendment, which is in furtherance of public health, safety, and welfare by more speedily locating a vacuum leak, thus avoiding sanitary sewer overflows.

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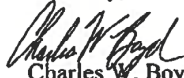
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Ms. Dinorah Dalmasy
RE: Talbot County—Resolution 316

June 2, 2022
Page 2

If you have any questions or concerns regarding these comments, please contact Keith Lackie at 410-713-3464, or keith.lackie@maryland.gov.

Sincerely,



Charles W. Boyd, AICP
Director of Planning Coordination

cc: Robin Pellicano; Nicholai Francis-Lau; Steve Alfaro; and Hannah C. Benzion, MDE;
Tony Redman, DNR; Dwight Dotterer, MDA
Joseph Griffiths; Tracey Gordy; Jason Dubow; Keith Lackie; Sylvia Mosser; and Cassandra Malloy, Planning

Existing Faribank and Bar Neck Systems

The Villages of Fairbank and Bar Neck are approximately 8,000 feet and 10,000 feet, respectively, south of the nearest connection point to the Region V (Tilghman) wastewater collection system. These villages were identified in the 1990 and 1992 Updates of the Talbot County Comprehensive Water and Sewerage Plan as having a high priority for sewer service due to failing septic systems. According to the W&S Plan the soils on Tilghman are poorly draining, with high groundwater levels. Many of the properties in Bar Neck and Fairbank have septic systems with drain fields that penetrate the groundwater and a majority of the houses are within 500 feet of the adjacent Chesapeake Bay and Choptank River waters

Existing Tilghman Region V (Tilghman) Collection System

The Region V WWTP was designed in 1982 and completed in 1987 as a two-lagoon system. The design flow is as follows: the sewage comes into a pump station by either gravity or force main, is discharged to the first lagoon and then flows through the second lagoon and eventually to the chlorine contact tank for disinfection prior to discharge to the Chesapeake Bay. Each lagoon has a design capacity of 11,158 cubic yards (2,253,626 gallons). The three (3) year daily average for years 2016 through 2018 is 96,400 gpd. The current NPDES Permit limits the Total Suspended Solids (TSS) concentration to less than 90 mg/l monthly average and the Bio-chemical Oxygen Demand (BOD) to less than 45 mg/l weekly average and 30 mg/l monthly average.

Tilghman Sewer Service Area

Region V (Tilghman) Sewer Service Area



Community History

Fairbanks Bar Neck communities are two clusters of residences on the southern end of Tilghman Island in Talbot County, Maryland in the Chesapeake Bay. The areas are flat and low lying with all elevations seven feet above mean sea level or less. The soils in the area are silt loams with slow permeability, a high wet season water table, and engineering qualities that are unsuitable for almost all uses except forestry. Farming was the primary land use from the islands first planting shortly after the first settlers arrived. The first English settlers arrived in 1656. Granted to Seth Foster in 1659, the Great Choptank Island was inherited in 1741 by Matthew Tilghman of Claiborne, whose descendants owned the island for the next 100 years. For its first 175 years, it was a family farm supplying grains, vegetables, fruit, cattle, pigs, and timber. Initially known as Great Choptank Island, the island became identified with a series of local families. It was owned by Matthew Tilghman's family from 1752 and has been known as Tilghman Island ever since. During the War of 1812, the island was briefly occupied by the British, who obtained provisions for their military forces. The community of Tilghman appeared later in the 1840s.

Fairbank and Bar Neck Septic History

Throughout its 366-year history, sanitary waste disposal has been by soil-based systems beginning with the outhouse. After the advent of plumbing, seepage pits and septic systems became the methods of choice for the villages of Fairbank and Bar Neck. Currently, the villages are still served by individual septic systems of varying ages and functionalities. None of these systems was well suited for their intended purpose because of the high-water table, relatively impervious soils. For these reasons, the 2002 Talbot County Water and Sewer Plan identified these communities as being a high priority for septic system elimination.

Talbot County Region V Sewer History

The Region V Wastewater Treatment Plant (WWTP) located on Tilghman Island has a design capacity of 150,000 gallons per day (gpd). The wastewater treatment plant was designed in 1982 and construction was completed in November 1987. The original area to be served by the wastewater treatment plant consisted of the current sewer service area established in 1987 and the community Camper's Circle. Included in the original design sewer service area but not connected or added to the sewer service area to the Region V Wastewater Treatment were lots in the Paw Paw Cove area, Tilghman Island Beach and the parcels along Harris Creek along Rude Avenue.

In 2004/2005, sewer was extended to the community of Tilghman Island Beach. From 2004/2005 to present, individual lots were added to the sewer service area along Black Walnut Point Road and on Leeward Lane on Tilghman Island.

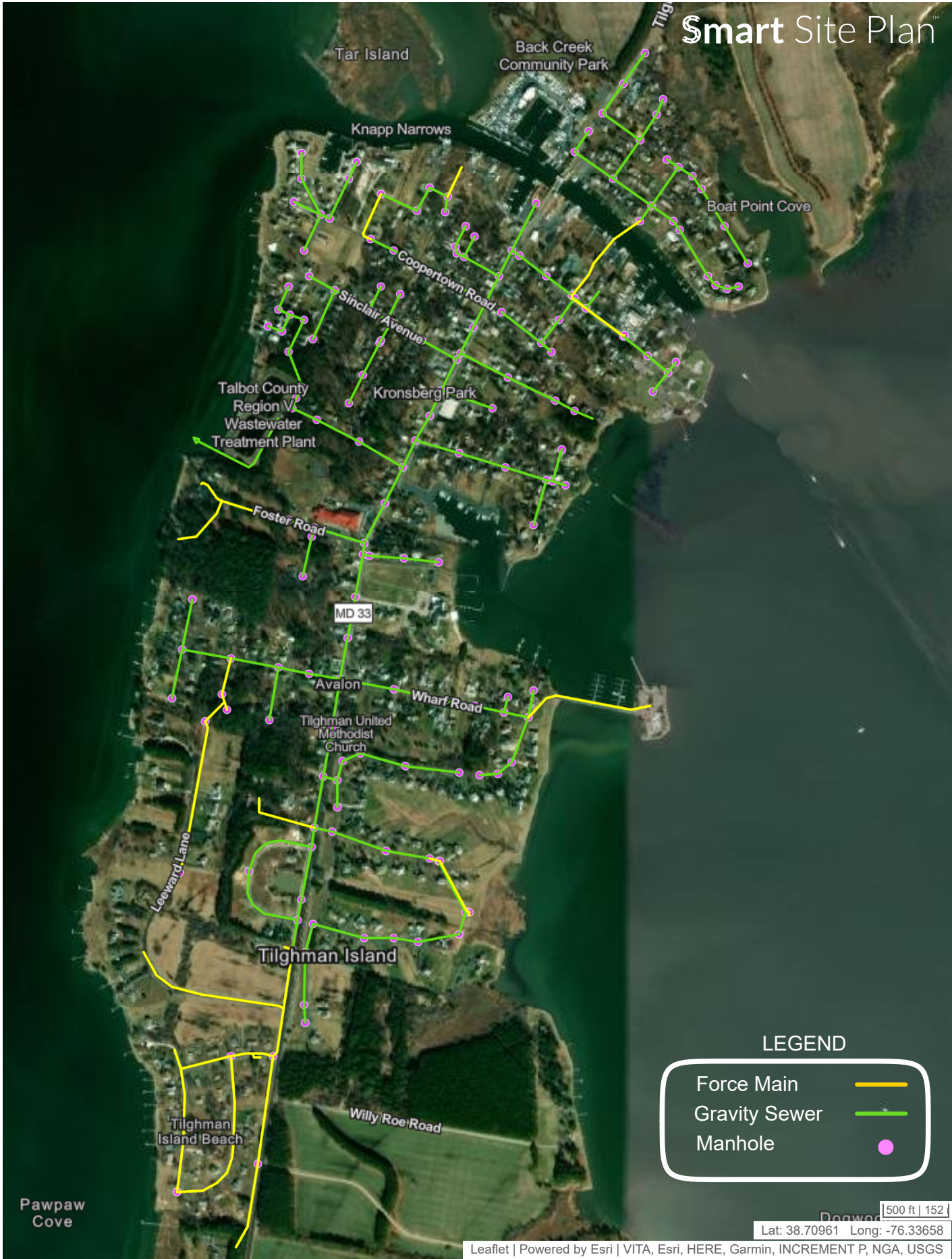
Prior to 1985 the Tilghman-Avalon-Fairbanks areas had a history of overflowing failing septic tanks that discharged directly into the surrounding water. Pollution of these areas led to a restriction on shellfish harvesting surrounding the island and created a detriment to the public health in the Tilghman-Avalon Area. The design of a sewer collection system and treatment plant was undertaken and began operating by 1985. As a result of the new plant, all waters around Tilghman Village are now open for shellfish harvesting except for Knapps Narrows to the northwest of Tilghman, a zone at the wastewater treatment plant outfall to the west of Tilghman, and Dogwood Harbor to the east. The plant has a design capacity of 150,000 gpd. In 2004/2005, sewer was extended to the community of

Existing Facilities - History

Tilghman Island Beach. From 2004/2005 to present, individual lots were added to the sewer service area along Black Walnut Point Road and on Leeward Lane on Tilghman Island.

Region V Sewer System

Smart Site Plan™



Effluent Limit Exceedances Report

Effluent Limit Exceedances Report

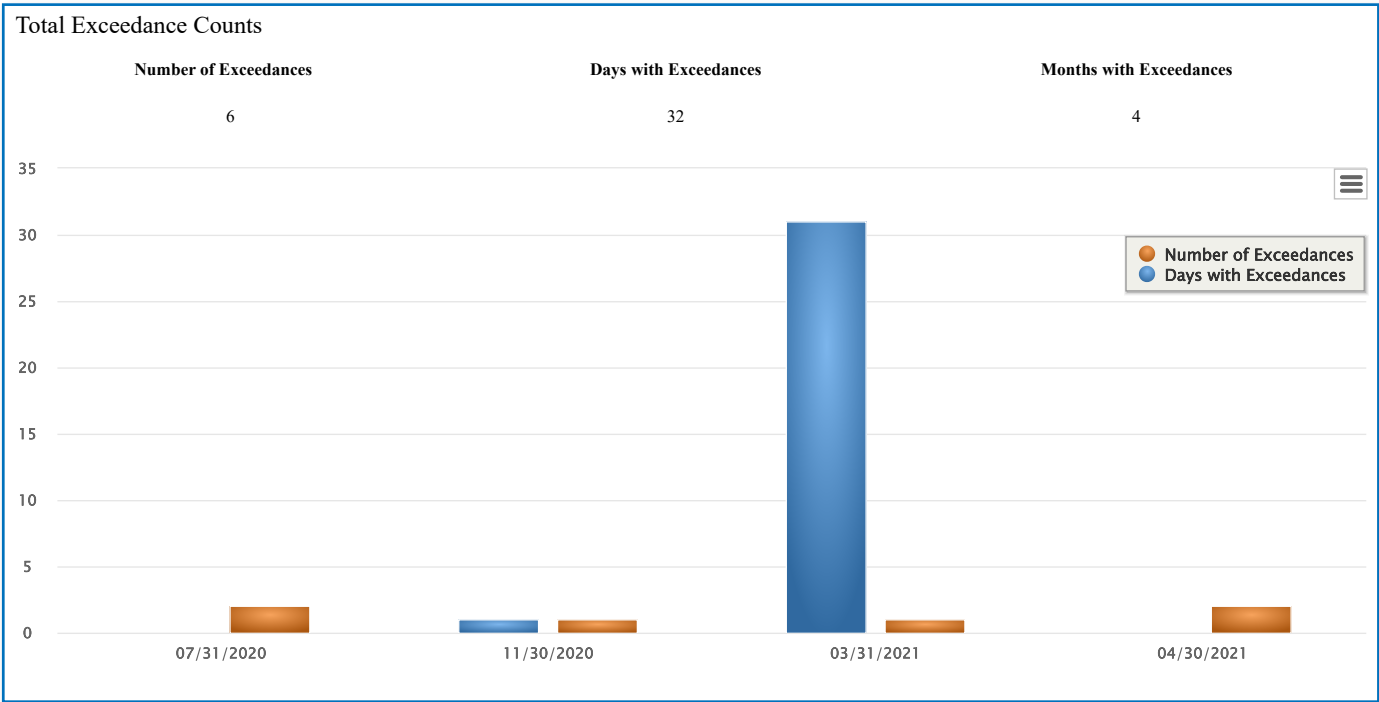
Effluent Limit Exceedances Report

TALBOT COUNTY REGION V WWTP, TILGHMAN, MD, 21671			
Facility Information		Receiving Watershed Information	
NPDES (National Pollutant Discharge Elimination System) ID:	MD0059463	State Water Body Name (ICIS (Integrated Compliance Information System)):	CHESAPEAKE BAY
FRS (Facility Registry Service) ID:	110009915093	WBD (Watershed Boundary Dataset) Subwatershed Name / 12-Digit WBD (Watershed Boundary Dataset) HUC (Hydrologic Unit Code) (FRS Derived):	Poplar Harbor-Chesapeake Bay
Other NPDES (National Pollutant Discharge Elimination System) IDs associated with this FRS (Facility Registry Service) ID:	None	Listed for Impairment (ATTAINS (Assessment, Total Maximum Daily Load (TMDL) Tracking and Implementation System)):	No
TRI (Toxics Release Inventory) ID(s):	None	Impairment Class (ATTAINS (Assessment, Total Maximum Daily Load (TMDL) Tracking and Implementation System)):	Not provided.
Major/Non-Major Indicator:	Non-Major	Enforcement Information	
Facility Type:	POTW	Last Formal Enforcement Action:	11/12/2009
Latitude/Longitude:	38.714846/-76.339801	Civil Enforcement Case Number:	MD-PS-10-0992
4-Digit SIC (Standard Industrial Classification) Code:	4952 - SEWERAGE SYSTEMS	DOJ/Court Docket Number:	--
6-Digit NAICS (North American Industry Classification System) Code:	--	Court Docket Number:	
Permit Information		Type Description:	State CWA Penalty AO
Permit Status:	Effective	Related Reports	
Permit Issuance:	STATE OF MARYLAND	View DMR Pollutant Loading Report	
Original Issue Date:	06/23/1983	View Detailed Facility Report	
Last Issue Date:	11/18/2020	View Effluent Charts	
Permit Effective Date:	01/01/2021		
Permit Expiration Date:	12/31/2025		
DMR Signer:	Jay Janney,Rachael Brown		
Approved Pretreatment Program:	No		
Combined Sewer Overflow (CSO) Outfall:	No		

Report Options

Adjust Date Range: Jan. 2020 → Dec. 2022

Display records identified as potential outliers or data errors



Existing Facilities - History

Exceedance Counts by Pollutant

Parameter Code	Description	Limit Type	Contains Potential Outliers?	Number of Exceedances	Days with Exceedances
00310	BOD, 5-day, 20 deg. C	MX MO AV		3	31
00310	BOD, 5-day, 20 deg. C	MX WK AV		2	0
00400	pH	MINIMUM		1	1

Exceedance Details

Date	Outfall	Parameter	Average Daily Flow (MGD)	Limit Type	DMR Value	Limit Value	Percent Exceedance	Load over Limit (lb/period)	Load over Limit (lb-eq/period)	Days per Period	Days with Exceedances
07/31/2020	001	00310 - BOD, 5-day, 20 deg. C	--	MX WK AV	71 mg/L	<= 45 mg/L	58	--	--	31	--
07/31/2020	001	00310 - BOD, 5-day, 20 deg. C	--	MX WK AV	30.84 kg/d	<= 25.4 kg/d	21	--	--	31	--
11/30/2020	001	00400 - pH	--	MINIMUM	6.30 SU	>= 6.5 SU		--	--	30	1
03/31/2021	001	00310 - BOD, 5-day, 20 deg. C	0.1410	MX MO AV	21.77 kg/d	<= 17.23 kg/d	26	310	--	31	31
04/30/2021	001	00310 - BOD, 5-day, 20 deg. C	--	MX MO AV	31 mg/L	<= 30 mg/L	3	--	--	30	--
04/30/2021	001	00310 - BOD, 5-day, 20 deg. C	0.0960	MX MO AV	22.68 kg/d	<= 17.23 kg/d	32	360	--	30	--

The Villages of Fairbank and Bar Neck Existing Conditions

The Villages of Fairbank and Bar Neck are approximately 8,000 feet and 10,000 feet, respectively, south of the nearest connection point to the Region V (Tilghman) wastewater collection system. These villages were identified in the 1990 and 1992 Updates of the Talbot County Comprehensive Water and Sewerage Plan as having a high priority for sewer service due to failing septic systems. According to the W&S Plan the soils on Tilghman are poorly draining, with high groundwater levels. Many of the properties in Bar Neck and Fairbank have septic systems with drain fields that penetrate the groundwater and a majority of the houses are within 500 feet of the adjacent Chesapeake Bay and Choptank River waters.

Existing Conditions Talbot County Region V (Tilghman) Sewer

The Region V WWTP was designed in 1982 and completed in 1987 as a two-lagoon system. The design flow is as follows: the sewage comes into a pump station by either gravity or force main, is discharged to the first lagoon and then flows through the second lagoon and eventually to the chlorine contact tank for disinfection prior to discharge to the Chesapeake Bay. Each lagoon has a design capacity of 11,158 cubic yards (2,253,626 gallons). The current NPDES Permit limits the Total Suspended Solids (TSS) concentration to less than 90 mg/l monthly average and the Bio-chemical Oxygen Demand (BOD) to less than 45 mg/l weekly average and 30 mg/l monthly average.

Region V WWTP Daily Average Flows for each Calendar Year

YEAR	2018	2019	2020	2021	2022
Current Capacity	150,000 gpd	150,000 gpd	150,000 gpd	150,000 gpd	150,000 gpd
Report Daily Average Flow	119,992 gpd	85,510 gpd	117,000 gpd	85,675 gpd	82,513 gpd
Remaining Capacity	30,008 gpd	64,490 gpd	33,000 gpd	64,325 gpd	67,481 god

As presented in "Region V WWTP Daily Average Flows for each Calendar Year" Table, the daily average flows from the Region V WWTP were high due to inflow and infiltration (I&I) that consist of extraneous flows associated with rain, groundwater and tidal flooding. In 2018, the daily average flow was 119,992 gpd, and in 2020, the daily average flow was 117,000 gpd. The flow in 2018 and 2020 had heavy rainfalls, thus impacting the daily average wastewater flows. Using the past two (2) years of flow data for 2022 and 2021, the wastewater flows averaged 84,094 gpd. The three (3) year average for the daily average flows from 2022, 2021 and 2020 was 95,063 gpd.

Assuming that there is no inflow and infiltration associated with the flows in 2021 and 2022, the estimated inflow and infiltration into the Region V WWTP would be 32,906 gpd using daily average flow for 2017 or 35,898 gpd using the daily average flows for 2018. In estimating the amount of inflow and infiltration entering the Region V WWTP, the daily average flows for 2021 and 2022 were subtracted from the 2018 daily average flows.

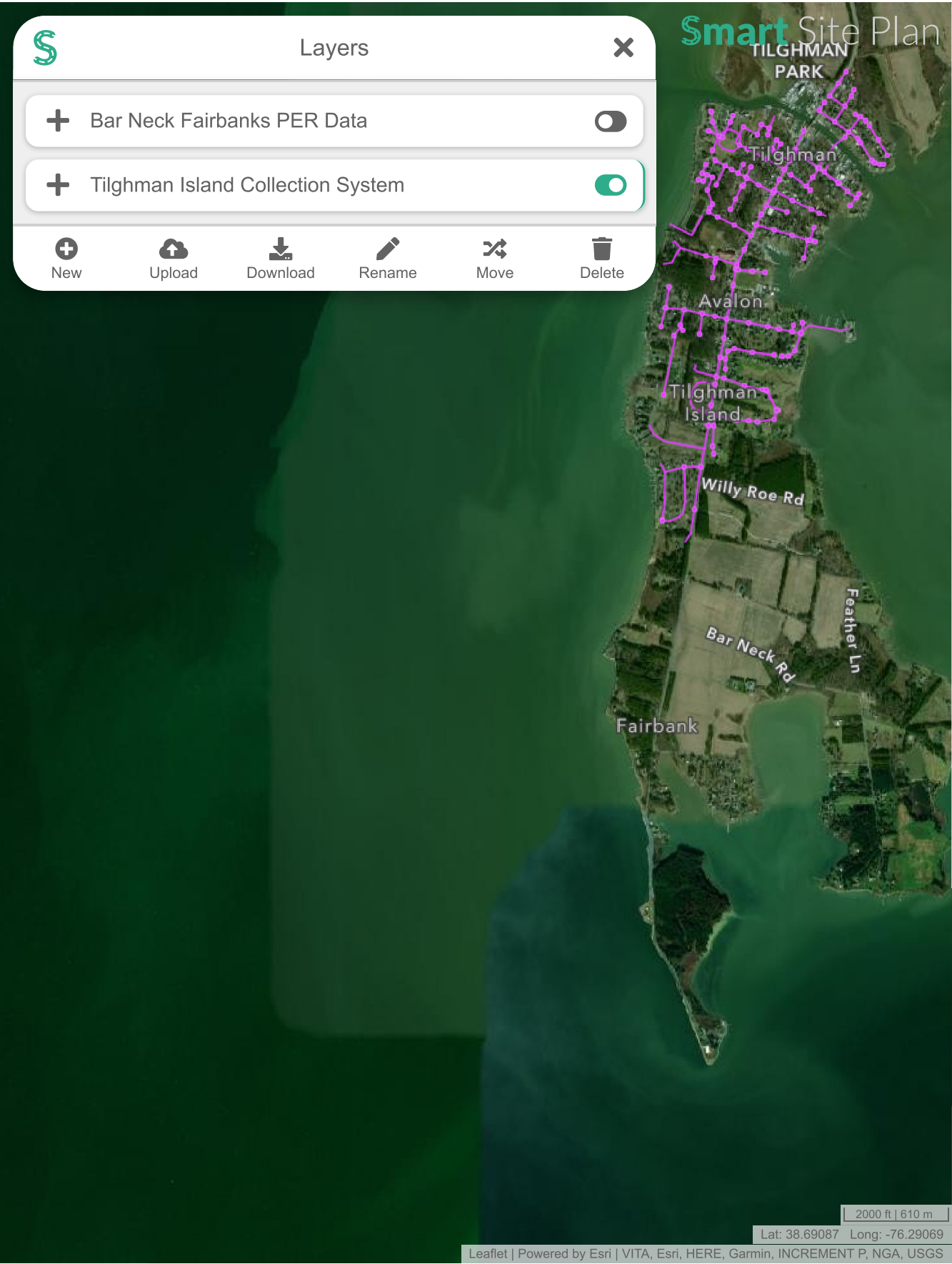
Existing Facilities - Existing Conditions

Current and Future Flows

AREAS	PROJECTED NUMBER OF EQUIVALENT DWELLING UNITS	ESTIMATED SEWERAGE FLOW (gpd)
Current Lots Served		84,094
Infill Lots	60	7,000
Tilghman Island Beach	40	Connected in 2004/2005
Avalon Phases 4 and 5	Added to infill lots	
Paw Paw Cove (unprogrammed)	Added to infill lots	
Rude Avenue (unprogrammed)	Added to infill lots	
Inflow and Infiltration		35,898
Remaining WWTP Capacity		23,008
Future Sewer Extension		
Bar Neck and Fairbank	Up to 146 – Grinder Pumps	18,250
REMAINING CAPACITY		4,758

2/11/2021

Region V Collection System
SSP | Fairbanks County | Bar Neck Fairbank



Villages of Fairbank and Bar Neck

The villages of Fairbank and Bar Neck do not have any centralized budget, financial analysis, or audits performed. All current infrastructure for water and sewer is privately owned by the residential owners. The financial burdens rest entirely on the residents of these communities.

Talbot County Region V

Talbot County is financially responsible for the Region V sewer system. The sewer systems owned by the County are operated out of the Sanitary District Enterprise Fund.

District Enterprise Fund

TALBOT COUNTY, MARYLAND

**SCHEDULE OF REVENUES AND EXPENSES
BUDGET AND ACTUAL
ENTERPRISE FUND – SANITARY DISTRICT
For the Year Ended June 30, 2020**

	St. Michaels District			Royal Oak District			Tilghman District		
	Revised Final Budget	Actual	Variance with Final Budget	Revised Final Budget	Actual	Variance with Final Budget	Revised Final Budget	Actual	Variance with Final Budget
OPERATING REVENUES									
Sewer service charges	\$ 1,112,000	\$ 1,114,805	\$ 2,805	\$ 268,850	\$ 276,780	\$ 7,930	\$ 312,900	\$ 310,867	\$ (2,033)
Sewer connection charges	480,000	257,238	(222,762)	144,000	12,000	(132,000)	7,450	1,490	(5,960)
Residential benefit charges	-	-	-	-	-	-	15,300	14,908	(392)
Wind/solar renewable energy	-	-	-	-	-	-	-	-	-
State and federal grants	-	-	-	-	-	-	-	-	-
Miscellaneous	31,500	227,019	195,519	1,000	2,067	13,487	1,000	2,091	1,091
Total operating revenues	1,623,500	1,599,062	(24,438)	413,850	290,847	(110,583)	336,650	329,356	(7,294)
OPERATING EXPENSES									
Salaries and related expenses	480,694	464,951	(15,743)	115,045	108,155	(6,890)	166,720	150,256	(16,464)
Professional fees	500	-	(500)	500	-	(500)	500	-	(500)
Office	11,750	12,025	275	7,450	5,261	(2,189)	7,800	9,390	1,590
Insurance	12,000	8,398	(3,602)	1,000	687	(313)	3,500	1,188	(2,312)
Contracted services	151,000	201,787	50,787	45,000	65,409	20,409	25,000	63,592	38,592
Repairs and maintenance	146,906	53,577	(93,329)	64,255	65,482	1,227	71,930	68,476	(3,454)
Utilities	192,900	154,137	(38,763)	50,250	39,472	(10,778)	20,500	20,473	(27)
Supplies and equipment	66,500	60,057	(6,443)	22,100	19,748	(2,352)	37,600	25,297	(12,303)
Other operating	46,750	12,925	(33,825)	3,750	3,188	(562)	4,100	3,790	(310)
Total operating expenses	1,109,000	967,857	(141,143)	309,350	307,402	(1,948)	337,650	342,462	4,812
Operating income (loss) before depreciation	514,500	631,205	116,705	104,500	(16,555)	(121,055)	(1,000)	(13,106)	(12,106)
Depreciation	-	911,588	911,588	-	150,003	150,003	-	159,058	159,058
Net operating income (loss)	514,500	(280,383)	(794,883)	104,500	(166,558)	(271,058)	(1,000)	(172,164)	(171,164)
NON-OPERATING REVENUES (EXPENSES)									
Intergovernmental revenues	-	1,190,543	1,190,543	-	-	-	-	-	-
Interest income	500	-	(500)	500	11,420	10,920	1,000	6,381	5,381
Interest expense	(59,000)	(41,490)	-	(13,000)	(6,876)	6,124	-	-	-
Net non-operating revenues (expenses)	(58,500)	1,149,053	1,190,043	(12,500)	4,544	17,044	1,000	6,381	5,381
Change in net position	456,000	868,670	412,670	92,000	(162,014)	(254,014)	-	(165,783)	(165,783)
OTHER BUDGETED EXPENSE									
Debt service	456,000	-	(456,000)	92,000	-	(92,000)	-	-	-
Capital outlay	-	-	-	-	-	-	-	-	-
Total other budgeted expenses	456,000	-	(456,000)	92,000	-	(92,000)	-	-	-
Budgeted net income (loss)	\$ -	\$ 868,670	\$ 868,670	\$ -	\$ (162,014)	\$ (162,014)	\$ -	\$ (165,783)	\$ (165,783)

Talbot County Debt Service

TALBOT COUNTY, MARYLAND

Notes to Financial Statements

June 30, 2020

6. LONG-TERM DEBT (continued)

Other Obligations (continued)

A summary of debt service requirements to maturity (excluding compensated absences and capital lease payments) by years is approximately as follows:

Primary Government	Bonds			Notes from Direct Borrowing and Direct Placement		
	Principal	Interest	Total	Principal	Interest	Total
Governmental Activities						
Fiscal year Ending June 30,						
2021	\$ 2,396,743	\$ 854,060	\$ 3,250,803	\$ 896,409	\$ 89,126	\$ 985,535
2022	3,153,227	1,138,541	4,291,768	925,166	60,368	985,534
2023	2,429,400	1,043,139	3,472,539	954,864	30,670	985,534
2024	2,514,109	950,822	3,464,931	17,719	-	17,719
2025	2,457,253	842,473	3,299,726	17,719	-	17,719
2026-2030	9,055,784	2,907,166	11,962,950	8,618	-	8,619
2031-2035	6,349,281	1,456,265	7,805,546	-	-	-
2036-2040	6,790,000	504,700	7,294,700	-	-	-
Thereafter	1,440,000	15,300	1,455,300	-	-	-
Total Governmental Activities	\$ 36,585,797	\$ 9,712,466	\$ 46,298,263	\$ 2,820,495	\$ 180,164	\$ 3,000,660
Enterprise Fund - Recreation Facilities (excluding capital leases)						
Fiscal year Ending June 30,						
2021	\$ 221,185	\$ 25,262	\$ 246,447	\$ -	\$ -	\$ -
2022	227,278	19,866	247,144	-	-	-
2023	155,000	14,300	169,300	-	-	-
2024	160,000	11,375	171,375	-	-	-
2025	145,000	7,250	152,250	-	-	-
2026-2030	145,000	7,250	152,250	-	-	-
Total Recreation Facilities	\$ 1,053,463	\$ 85,303	\$ 1,138,766	\$ -	\$ -	\$ -
Enterprise Fund - Sanitary District						
Fiscal year Ending June 30,						
2021	\$ -	\$ -	\$ -	\$ 880,107	\$ 190,421	\$ 1,070,528
2022	-	-	-	889,207	181,717	1,070,924
2023	-	-	-	896,759	175,129	1,071,888
2024	-	-	-	895,749	174,885	1,070,634
2025	-	-	-	861,099	154,928	1,016,027
2026-2030	-	-	-	2,690,957	662,641	3,353,598
2031-2035	-	-	-	1,959,366	505,554	2,464,920
2036-2040	-	-	-	2,116,976	347,944	2,464,920
2041 - 2045	-	-	-	2,288,207	176,713	2,464,920
2046- 2050	-	-	-	965,101	24,012	989,113
Total Sanitary District	\$ -	\$ -	\$ -	\$ 14,443,528	\$ 2,593,944	\$ 17,037,472

Water/Energy/Waste Audits

No water, Energy, or waste audits have been performed on the Region V facility. Estimated inflow and infiltration into the Region V WWTP via the collection system would be 32,906 gpd using daily average flow for 2017 or 35,898 gpd using the daily average flows for 2018. In estimating the amount of inflow and infiltration entering the Region V WWTP, the daily average flows for 2021 and 2022 were subtracted from the 2018 daily average flows. Smoke testing was performed to help identify potential I&I sources for the collection system in 2022. These potential sources are currently being corrected.

SMOKE TESTING - AREAS IDENTIFIED



Health

A visual house to house survey of septic system status was performed for this PER. A drive through the project area on December 31, 2020, revealed the telltale sign of distressed septic systems, spots of bright green grass. The bright green spots are indicative of the surfacing of septic wastewater. Surfacing wastewater presents a health hazard and an environmental problem. Runoff from areas saturated with septic wastewater can promote the eutrophication of waterbodies receiving the flow. Water bodies are classified as “impaired” when they are too polluted or otherwise degraded to support their designated and existing uses. All of Talbot County's major watersheds are impaired for nutrients (nitrogen, phosphorus and/or other impairments) and so are by definition not suitable as receiving waters.

Recommendations For Talbot County Septic Systems

Talbot County has already implemented one of the most significant strategies to reduce nutrient loads from suburban and rural communities by connecting households with traditional septic systems to a wastewater treatment plant (WWTP), which has a lower nitrogen load than traditional septic systems. An alternative to hooking up to the WWTP is to convert the traditional septic system to a best available technology (BAT) septic system. Maryland Department of the Environment (MDE) outlined guidance from the Chesapeake Bay Program to determine nitrogen loadings from septic systems in “2006 TMDL Implementation Guidance for Local Governments.” While there are many variables that affect the nitrogen loading from a given septic system, the guidelines assume that on average, 9.5 pounds of nitrogen per person per year will be delivered to a septic drain field and, in the critical area (within 1000-ft of a tidal body of water), 80% of the nitrogen will be delivered to the nearest body of water. These assumptions, combined with 2010 Census data of 2.20 people/household for Talbot County, lead to an average annual septic system loading rate of 16.72 pounds TN per household. $9.5 \text{ lbs TN} \times (0.8) \times 2.20 \text{ people/household} = 16.72 \text{ lbs (pounds) TN / household}$. Depending on the technology implemented at the WWTP this total N load per household could be reduced by approximately 90% by taking the household off septic and onto the WWTP¹.

¹Coastal Community Initiative (CCI). 2010. Coastal management for Traditional Villages. Maryland's Chesapeake and Coastal Program proposal.

Region V Failing Septics

Prior to 1985 the TilgInnan-Avalon-Fairbanks areas had a history of overflowing failing septic tanks that discharged directly into the surrounding water. Pollution of these areas led to a restriction on shellfish harvesting Surrounding the island and created a detriment to the public health in the Tilghman-Avalon Area. The design of a sewer collection system and treatment plant was undertaken and began operating by 1987. The plant has a design capacity of 150,000 gpd with no room for future expansion. Approximately fifty percent of the capacity is currently being utilized. This plant is the current Region V plant serving the Tilghman area but does not yet service the southern end of the island where Fairbanks and Bar Neck are located. These communities suffer with the same failing septic issues which prompted the construction of the Region V plant in 1985 to service the more densely inhabited Tilghman Island-Avalon area. Fairbanks and Bar Neck's failing septic problems still need to be addressed. The proposed solution must centralize collection of wastewater and connect to the Region V plant to alleviate the health and environmental issues caused by the failing septic systems as documented by the Talbot County Health Department.

EXHIBIT 3-3



OFFICE OF ENVIRONMENTAL HEALTH
215 BAY STREET, SUITE 4, EASTON, MD 21601
Maria Maguire, MD, Health Officer
Anne F. Morse, LEHS, Director

PHONE: (410) 770-6880

FAX: (410) 770-6888

July 14, 2022

Mr. Ray Clarke, P.E.
County Engineer
Talbot County Department of Public Works
215 Bay Street
Suite 6
Easton, MD 21601

Re: Septic Elimination and Extension of Public Sewer to Fairbanks & Bar Neck

Ray:

Please be advised that this office supports the above referenced project to eliminate on-site sewage disposal systems and provide the opportunity for property owners within the propose sewer service area of Fairbanks and Bar Neck to connect to public sewer when it becomes available.

As you know, all of the properties included in the proposed sewer extension area are located within Management Area "B" of the Talbot County Groundwater Protection Report and therefore are served by individual on-site sewage disposal systems that incorporate the use of the direct penetration of the ground water as a means of disposing of wastewater. The lack of an available soil treatment zone on these properties precludes the soils from being able to attenuate and treat wastewater before being discharged into the groundwater thus contributing to the degradation of the Chesapeake Bay watershed.

This office has worked with a number of property owners referenced within the proposed sewer service area to identify an area on their property that would accommodate the installation of a septic system that would replace the current system, which has begun to show signs of failure (backing up in the dwelling or discharging onto the surface of the ground). Many of the properties were created years ago, without the benefit of the establishment of an approved Sewage Disposal Area. The age of the septic systems and the fact that many of the property owners have replaced their septic systems multiple times have resulted in the no available land area left on the property to install another septic system. In addition, the challenge of finding suitable area for sewage disposal is also impacted by one or more of the following parameters:

- Poorly Drained Soils
- High Seasonal Groundwater tables
- Inability to comply with required regulatory setbacks from tidal water, tidal/nontribal wetlands, drainage ways and individual drinking water supply wells.

The issuance of sanitary construction permits for septic system replacements on these properties often results in the approval of non-conforming septic systems, or holding tanks. (Non-conforming septic systems include elevated sand lined trenches; variances granted to encroach on required drinking water supply well setbacks, variances granted to encroach on required environmental setbacks, systems designed based on occupancy versus total wastewater flows from the dwelling, etc.)

The extension of public sewer to the properties within this sewer service area will eliminate the use of on-site sewage disposal systems and therefore reduce the impacts to many environmentally sensitive areas, which have significant ecological value to the Chesapeake Bay estuarine system.

If you have any questions regarding this letter of support, please do not hesitate to contact me at 410-770-6880.

Sincerely,

A handwritten signature in blue ink that reads "Anne F. Morse, LEHS". The signature is fluid and cursive, with the first name "Anne" being the most prominent.

Anne F. Morse, LEHS
Director of Environmental Health

System Age

The age of the septic systems in the villages of Fairbank and Bar Neck are varied and not definitively known. It is anticipated that these systems are all toward the end of their lifecycle and will be eliminated entirely to make way for the centralized sewer system. The Region V Wastewater Treatment Plant located on Tilghman Island has a design capacity of 150,000 gallons per day. The wastewater treatment plant was designed in 1982 and construction was completed in November 1987. The original area to be served by the wastewater treatment plant consisted of the current sewer service area established in 1987 and the community in Paw Paw Cove, Tilghman Island Beach and the parcels along Harris Creek along Rude Avenue. The WWTP was upgraded in 2006 by adding aerators and the lagoons were dredged in 2006 as well. The collection system was last evaluated in 2003 and was found to be in good condition. The North, East, and South pumping stations were upgraded in 2006 in conjunction with the WWTP upgrade.

Projected growth

The projected growth for the communities of Fairbank and Bar Neck is minimal. However, there are several subdivided lots shown as lots 94 to 101 within the proposed sewer service area along Bar Neck Road (Bar Neck Undeveloped Lots - EXHIBIT). There are similar undeveloped lots throughout the project area which have development potential. The subdivided lots 94-101 and the undeveloped lots within the proposed service area will receive stub-outs for future development and service connections.

The existing Region V WWTP in Tilghman is limited in its ability to expand capacity. Any significant development would require an upgrade to the Region V WWTP or consolidation to the existing Region II WWTP. Both options are being evaluated by the County for feasibility. Until an alternative for Region V is chosen, population in this analysis will remain mostly flat as the capacity in the current Region V WWTP is limited especially after allocation of capacity to the Fairbanks and Fair Bank villages. The capacity which would be needed to allocate sewer to the Fairbanks and Bar Neck villages will be within but close to the design limits of the plant. Any additional growth aside from the 124 lots discussed in this PER would require modifications or upgrades to the Region V WWTP.

YEAR	2018	2019	2020	2021	2022
Current Capacity	150,000 gpd	150,000 gpd	150,000 gpd	150,000 gpd	150,000 gpd
Report Daily Average Flow	119,992 gpd	85,510 gpd	117,000 gpd	85,675 gpd	82,513 gpd
Remaining Capacity	30,008 gpd	64,490 gpd	33,000 gpd	64,325 gpd	67,481 gpd

From the 2023 DRAFT Report of the Review of the Talbot County Comprehensive Water and Sewer Plan, pg 81

AREAS	PROJECTED NUMBER OF EQUIVALENT DWELLING UNITS	ESTIMATED SEWERAGE FLOW (gpd)
Current Lots Served		84,094
Infill Lots	60	7,000
Tilghman Island Beach	40	Connected in 2004/2005
Avalon Phases 4 and 5	Added to infill lots	
Paw Paw Cove (unprogrammed)	Added to infill lots	
Rude Avenue (unprogrammed)	Added to infill lots	
Inflow and Infiltration		35,898
Remaining WWTP Capacity		23,008
Future Sewer Extension Bar Neck and Fairbank	Up to 146 – Grinder Pumps	18,250
REMAINING CAPACITY		4,758

From the 2023 DRAFT Report of the Review of the Talbot County Comprehensive Water and Sewer Plan, pg 82



- SixInch/SixInchImagery
- C-PROP-2FM
- C-PROP-4FM
- Project Properties
- Proposed Residential Con...
- PropSTEP/STP Tank/System
- Stub Out

Alternatives Description Details		
System Component Type:	Collection	System Component Name: Force Main and Septic Elimination
Description		
Alternative Name:	No Action (Alternative 1)	
Is this alternate solution feasible or is it not feasible?		
Feasibility	No	

Explanation for Lack of Feasibility

The current method for wastewater treatment and disposal in the project area is the individual on-site septic system. No Action would continue this practice with individual property owners bearing the cost of maintenance and replacement of the systems as needed. The flat topography of the project area creates a septic system design, repair and construction challenge. The flat land surface, soils with slow percolation, and poor storm drainage prevent the construction of septic systems that comply with COMAR standards. Repairs require design accommodations that may or more likely will not correct septic system failure. Considering the high cost of septic system repair, homeowners must expend tens of thousands of dollars without a guarantee. The only corrective action for a septic system that is in disrepair or failed is to convert the septic tank to a holding tank and have the contents pumped weekly at a cost around \$500. The approximately \$26,000 annual cost is greater than most property owners can afford. The low flat elevation makes the project area vulnerable to the effects of sea level rise and storm surge. In the near term (through 2050) the major effects are likely to be due to storm surge. In the long run climate induced sea level rise will exacerbate storm surge. Storms such as hurricane Isabel in 2013 will flood the entire project area. The flooding that accompanies storm surge and sea level rise will affect existing septic systems by promoting the release of septic tank effluent to the surface along with bacteria, nitrogen, and phosphorous. Any release of sewage to the surface endangers human health.

Additional Concerns

The current method for wastewater treatment and disposal in the project area is the individual on-site septic system. Given site, regulatory, and environmental conditions it is impossible to operate, repair, replace or create septic systems that comply with these constraints. Owner occupied homesteads are likely to be unable to afford the cost of upgrade and maintenance. Many properties in the project area do not have sufficient acreage to comply with COMAR septic system regulations. Even the most advanced septic treatment systems on the market if permitted will not fit within the space available. These villages were identified in the 1990 and 1992 Updates of the Talbot County Comprehensive Water and Sewerage Plan as having a high priority for sewer service due to failing septic systems. The soils on Tilghman are poorly drained, with high groundwater levels. Many of the properties in Bar Neck and Fairbank have septic systems with drain fields that penetrate the groundwater and a many

Alternatives Considered - Description

of the houses are within 500 feet of the adjacent Chesapeake Bay and Choptank River waters.

System Component Type: Collection

System Component Name: Force Main and
Septic Retirement

Alternative Name: No Action (Alternative 1)

Alternative Considerations

- i. The no-action alternative is untenable from both an engineering and regulatory perspective.
 - 1. Site elevation, soil suitability, and high water table make continued reliance on soil disposal systems impossible
 - 2. Site elevation, soil suitability, and high water table violate all basic engineering and regulatory requirements

Alternatives Description Details	
System Component Type:	Collection
System Component Name:	Force Main and Septic Retirement
Description	
Alternative Name:	Vacuum Sewer (Alternative 2)
Is this alternate solution feasible or is it not feasible?	
Feasibility	✓ Yes

Vacuum Sewer Overview

Vacuum sewers are a technology for conveying wastewater in areas with flat low elevation, high groundwater, and shallow bedrock. Flow in the vacuum sewer is affected by opening and closing of a unique valve. The valve is located in a small pit at the intersection of the residence sewer and the vacuum sewer. When the valve opens, it allows the aspiration of about 10 gallons of wastewater into the sewer. Once in the sewer, the sewerage is propelled along a sawtooth arrangement of sewer pipes that are connected to a vacuum pump station. The vacuum pump station includes a steel tank to accumulate a set volume of sewerage. When the specified volume is collected, the wastewater is pumped forward to the sewer system and treatment plant. Vacuum pumps create a negative air pressure in the collection tank and the sewers.

Vacuum Sewer Discussion

Vacuum sewerage systems are unlike any other technology for the conveyance of wastewater. Vacuum sewerage systems are used in both industrial and municipal applications. The principals of operation are the same in either case. A vacuum sewerage system uses differential air pressure and gravity to rapidly transport sewage via a network of essentially empty pipes from individual or combined Collection Pits on user premises to a central Vacuum Pump Station. The accumulated wastewater is then pumped using conventional pumps to a discharge location. A batch of sewage enters the vacuum system when an atmospheric vacuum valve opens in a Collection Pit and the sewage is sucked into the Vacuum main. The vacuum valve remains open briefly following the removal of the sewage from the pit sump allowing atmospheric air to enter the suction pipe and blow the sewage batch toward the Vacuum Pump Station.

Vacuum Pump Station

The Vacuum Pump Station (VPS) houses vacuum pumps, a collection tank to receive and accumulate wastewater, discharge pumps (to send the sewage to a treatment plant or a conventional wastewater collection system such as the Tilghman system), and controls. Based on discussions with FloVac at least 2 vacuum pump stations will be required for the Fairbanks Bar Neck

project. The estimated cost of each station according to Flo-Vac is \$850,000. In addition to the station contents described, a backup generator would be located at the VPS ensuring uninterrupted service due to power loss. Each service connection includes a collection pit which houses a vacuum valve which interfaces between the collection pit sump which is not under vacuum and the negative pressure in the vacuum mains. The vacuum is created by the vacuum pumps at the VPS. When 10 gallons of sewerage accumulates in the collection pit from the building served, air pressure on the valve's controller will trigger the valve to open allowing sewage and then air to enter the vacuum mains at a high velocity. It is the expanding air that propels the sewage to the VPS.

No power is required at the collection pit.

Flo-Vac recommended an installation cost per service was \$2,500.

Vacuum Mains

The Vacuum Mains (either PE or PVC) are designed to be as shallow in the ground as possible. The slope is steeper than a gravity system with similar pipe diameter. The contractor builds steps in the pipework to keep the mains from getting too deep. The series of steps gives the vacuum sewer a sawtooth look on the plan profile. The more steps that are installed, the more hydraulic losses are created, lessening the distance that the mains can go. It is important to have collection pits evenly distributed around the catchments and along the vacuum mains to ensure fast movement of sewage to the VPS. This requirement is difficult to meet in older communities.

For evaluation purposes, a vacuum sewer is more like a conventional sewer than STEP or Grinder Pump systems. Below is a copy of comments related to vacuum sewer experience in Queen Anne's County.

Feedback From Existing System Operators

The Queen Anne's County, Maryland department of Public Works was contacted for comment on their experience with vacuum sewers. QAC has one of the largest vacuum sewer systems in the nation. The following is a copy of the county's response to our questions.

1. Entirely intolerant of I/I. Work ok when dry, but not when it rains. Most of the I/I is from broken cleanouts on the gravity service lateral, although a fair amount of illegal connections, i.e. sump pumps. We now put all new gravity cleanouts in a small manhole to protect them from breaking.
2. Once the vacuum mains become waterlogged, it can be days to restore full service and need to utilize numerous vacuum trucks to assist.
3. Even on dry days, constant maintenance ongoing due to controller failures, valve failures, etc. Note we have the AIRVAC system, not sure if FLO-Vac would be any better.
4. We are starting to spend significant dollars on monitoring systems placed in select vacuum pits in an attempt to hopefully stay ahead of the problem - cost is about \$1,500 per pit.
5. All mechanical systems have headaches, hard to imagine any being worse than vacuum though.
6. As a result of TS Isaias in August, we had a couple dozen property damage claims and it took three full weeks of around the clock effort to restore one community to full service. Other communities also struggled, but this one community is always by far the worst – and it is a relatively new system – 1994.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Vacuum Sewer (Alternative 2)		

General Design Criteria

There are at least three major vacuum sewer system vendors. The design of these systems requires more attention to detail than all other alternatives. It is prudent to work with a system vendor to develop the design. The system suppliers have design manuals and experienced technical advisors to facilitate design and for assistance in preparing preliminary designs and cost estimates. For the Fairbanks Bar Neck project, it is possible that two vacuum pump stations may be required because of the separation between the two service clusters.

Odor Control

Odor control can be an issue in the vicinity of the vacuum pump station. The severity of this issue varies in proportion to the detention time of the sewerage within the vacuum lines. Due to the long pipe run from Bar Neck to the gravity collection system and the relatively low flow for Bar Neck and Fairbank, this could present a noticeable odor control issue for the system. The system would have to include odor control to mitigate odor issues.

Specific Alternative Considerations

- i. Vacuum sewers are totally dependent on vacuum to propel wastewater along the sewer. The vulnerabilities of the technology are the reliability of the vacuum station, the availability of replacement parts, the reliability of the vacuum valve, and the importance of pipe installation.
- ii. There are 3 (and maybe more) vacuum sewer manufacturers, Airvac, Flovac, and Redivac. Adoption of any system requires a long-term relationship with the supplier for parts and operation expertise. Business failure by a manufacturer and the consequent loss of access to parts could shut down the entire sewer system.
- iii. Work arounds for operating problems or service interruption can be difficult because the vacuum system has limited alternatives for generally available components.
- iv. One of the worst problems is a sewer main break by excavation. Soil and debris that get aspirated into the vacuum main can be difficult to isolate and remove.
- v. Queen Anne's County has one of the largest vacuum sewer service areas in the nation. We called the county Department of Public Work with questions about QA County's experience and spoke to the person most knowledgeable with Vacuum Sewers. The county's advice was to avoid vacuum sewers if possible.
- vi. Base cost for a Vacuum sewer pump station is \$850,000 according to a FloVac representative. Because of the long distance between Bar Neck and Fairbanks 2 pump stations are likely to be

Alternatives Considered - Design Criteria

required. The FloVac representative recommended a budget cost for each service lateral connection of \$2,500.

Alternatives Considered - Map

System Component Type:

Collection

System Component Name:

Force Main and
Septic Retirement

Alternative Name:

Vacuum Sewer (Alternative 2)

Map of Existing and Proposed Areas

Attached are the existing Region V sewer area and the proposed vacuum sewer extension service area.



System Component Type: Collection

System Component Name: Force Main and
Septic Retirement

Alternative Name: Vacuum Sewer (Alternative 2)

Elevation

The entire project area is no more than 7ft. above mean sea level with many spot locations that are only four, five, and six feet. The low flat topography makes the project area vulnerable to the effects of sea level rise and storm surge. In the near term (through 2050) the major effects are likely to be due to storm surge. In the long run climate induced sea level rise will exacerbate storm surge. Storms such as hurricane Isabel in 2013 will submerge the entire project area. Flooding can cause the existing septic systems to fail and release bacteria and algae causing nitrogen and phosphorous to the surface, stormwater ditches, low spots, and the nearby bay. Vacuum sewers and the three of the four other alternatives considered in this report are intended to prevent the environmental damage associated with continued reliance on septic systems. The flooding that accompanies storm surge and sea level rise can affect vacuum sewer design and operation. The known flooding in the Fairbanks Bar Neck area may require design or equipment changes to prevent overwhelming the sewer.

Soils

Most of the project area soils are Keyport silt loam. The soil is almost rock hard in the dry summer season and sticky and plastic when wet. In the early spring the soil is saturated at 20 inches depth. Vacuum sewers like small diameter STEP and Grinder pump sewers can be laid at much shallower depth than conventional gravity sewers. The shallower sewers will reduce dewatering in the wet season and the management of soil stockpiles in roadways. The reduction of soil excavation volume will also minimize the physical damage to the existing stormwater ditch network and the associated erosion and sedimentation impact. During the wet season soil plasticity may limit the use of backhoe, dump trucks, and septic tank delivery/placement truck. Erosion and sedimentation control during the wet season will be difficult to control.

Storm Drainage

There is no formal storm drainage in the project area. What drainage there is, is limited to roadside ditches which become choked with grass and brush growth. The flat topography and ditch vegetation create numerous areas of low-level ponding of stormwater. The ditch maintenance process only clears overgrowth to restore a flow channel. Ditch slope tends to match the surrounding surface slope without correction of sags and humps which can preserve and aggravate existing ponding. It is common in residential areas with sewer service for homeowners to attach storm and roof drains to the sewer to address surface drainage problems thereby overloading the capacity of sewers and treatment systems. Of all the sewer alternatives, vacuum sewers are the least tolerant of I&I.



Drainage Ditch



Ditch Clearing

Environmental Impacts

Environmental impacts will be minimal. Vacuum lines can be installed without the need for deep trenching as required for conventional gravity systems. All disturbance from vacuum lines will be temporary and mitigated upon completion. Sediment and erosion control is recommended during the temporary disturbances. While there are wetlands in the vicinity of this project, no disturbance temporary or permanent is proposed within any mapped wetlands. There are no mapped endangered species habitats located within the project area and no sites of archeological significance are known to exist within the area. The only increase in impervious area will occur at the pump station site. Stormwater management for any pump station would be handled through rooftop and non-rooftop disconnects and other appropriate BMPs as needed.

Pawpaw
Cove

Dogwood
Harbor

Tilghman Island

Blackwalnut
Cove

- Estuarine
- Palustrine
- Riverine
- Estuarine
- Lacustrine
- Marine
- Palustrine
- Riverine
- Estuarine
- Lacustrine
- Marine
- Palustrine
- Riverine
- Wetlands - Polygon - Speci...
- Wetlands - Linear - Special...
- SixInch/SixInchImagery
- 2.5in Forcemain
- 3in Forcemain
- 4in Forcemain
- Project Properties
- Proposed Residential Con...

Smart Site Plan™

ALTERNATIVE 2 - WETLANDS



SCALE 1" = 422 ft
└───┘

DATE Mar 13, 2026

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Vacuum Sewer (Alternative 2)		

Staging Area

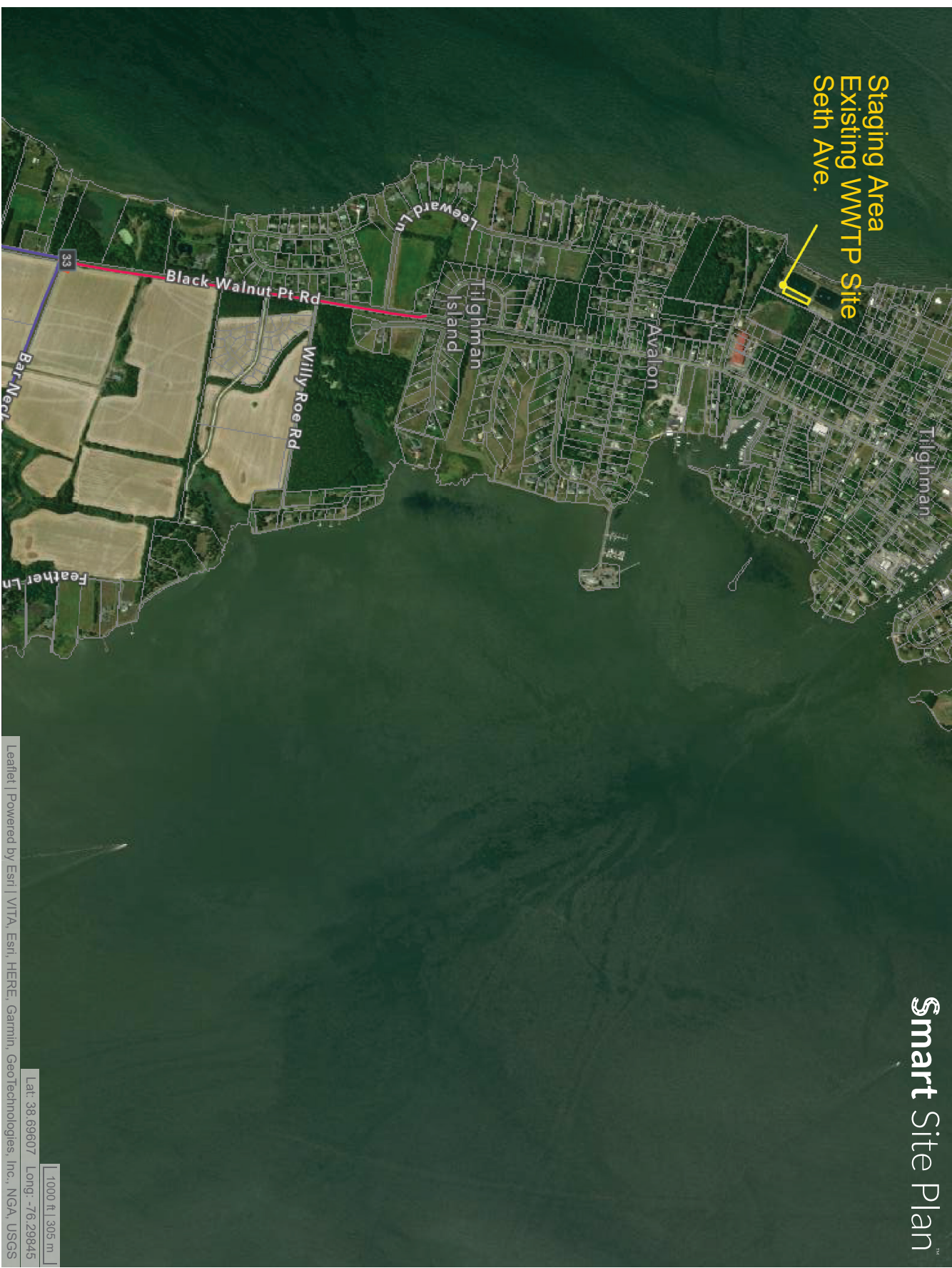
The project will require a staging area for construction operations. Vacuum sewers will reduce the size of the staging area by reducing the amount of soil that needs to be stored out of the way to help keep the roadways open. Staging area is recommended to be the existing WWTP parcel Map/Grid/Parcel 0044A/0000/0277 with road access through Seth Ave.

3/3/22, 1:36 PM

SSP | Talbot County Bar Neck Fairbank

Smart Site Plan™

Staging Area
Existing WWTP Site
Seth Ave.



https://app.smartsiteplan.com

Leaflet | Powered by Esri | VITA, Esri, HERE, Garmin, GeoTechnologies, Inc., NGA, USGS

Lat: 38.69607 Long: -76.29845

1000 ft | 305 m

Vacuum Pump Stations

For the Fairbanks Bar Neck project, it is possible that two vacuum pump stations may be required because of the separation between the two service clusters. This means that the County may need to secure 2 parcels of land on which to install these pump stations. The County does not currently own any additional land along the proposed runs of vacuum sewer mains.



System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Vacuum Sewer (Alternative 2)		

Roadways

Most of the roads in the project area are little more than lanes with a travel width less than 15 feet. Maintenance of a usable travel way may require the transport of excavated soil to a storage area while pipe and other underground construction is ongoing and its return following completion of the installation.

Soils

A major issue with vacuum sewer installation is the control and care that is required to install vacuum sewer pipe. Pipe slopes, lifts, and fitting assembly are much more exacting than other sewer system types. Saturated, plastic, soils during the wet season and dry clumpy soil during the summer will make sewer installation a challenge.

Residential Lot Site Restoration

Each sewer extension connection installed on a residential lot will require lot restoration to be coordinated with the homeowner. Having a uniform approach for each and every homeowner will inevitably cause some homeowners to be unhappy with lot restoration and landscaping conducted by the County and their contractors. With this understanding, it is recommended that there be a residential site restoration allowance of \$1,500 per residence allotted to each residential connection. Coordination with each resident after restoration is essential to maintain satisfaction of each resident. This suggestion is included in the estimated project budget as a total sum of \$156,000 which allows for the \$1,500 per lot at 104 lots. Note there are an additional 20 undeveloped lots which stub outs will be installed on with minimal lot disturbance and restoration required.

Water Table

The water table in the proposed project area is high. This is the most significant construction consideration for the project. Dewatering will be a concern when excavating for line placement and individual connections. Should the design engineer choose directional drill as the method of main installation, the drill pit should be kept clear of water. This can be achieved by dewatering or by avoiding excavation and drilling during the wettest months of the year of March through May.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Vacuum Sewer (Alternative 2)		

Water Conservation

Vacuum systems require less water than a traditional gravity system to transfer solids to a centralized wastewater treatment plant. This water conservation would not be realized to the homeowners unless conversion to low-flow toilets were installed in the future.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Vacuum Sewer (Alternative 2)		

Pumping Station

Green infrastructure is a cost-effective, resilient approach to managing wet weather impacts that provides many community benefits. While single-purpose gray stormwater infrastructure, conventional piped drainage, and water treatment systems is designed to move urban stormwater away from the built environment. Green infrastructure reduces and treats stormwater at its source while delivering environmental, social, and economic benefits. The proposed pumping station building will incorporate rooftop and non-rooftop disconnects to promote groundwater recharge in the impervious area associated with the pumping station. The practice of using rooftop and non-rooftop disconnects is encouraged by the Environmental Protection Agency (EPA).

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Vacuum Sewer (Alternative 2)		

Growth

A sewer solution to the Fairbanks Bar Neck communities will increase the incentive for land development by removing the current disincentives associated with wastewater management. Presently, development is focused in the nearby Tilghman Island community because it is served by municipal sewer. A sewer solution for Fairbanks and Bar Neck would connect these communities to the Tilghman Island sewer system. The Fairbanks Bar Neck area currently provides some of the most affordable residential real estate in this area of Talbot County. Sewer associated development would allow much higher residential density than would be allowed under current land use regulations. The value of the tradeoff where reduced health and environmental risk is achieved in return for higher density development is difficult to quantify.

Wells

All properties in the project area are served by on site well water supplies. Although an on the ground survey of the proximity of wells and septic systems in the project area was not performed, from a drive by perspective it is difficult to envision an arrangement of wells and septic systems that provide sufficient separation.

Sea Level Rise

Per NOAA 2022 Sea Level Rise Technical Report, project sea level rise is expected to be 10-12 inches over the next 30-years. This will exacerbate existing water table challenges impacting septic systems along Maryland's waterways. Failing and underperforming septic systems have reduced ability to treat nutrient loads prior to nutrients entering watersheds. Providing centralized treatment eliminates the possibility of failing septic systems leaching into groundwater and into Maryland's waterways.

Collection

System Component Name:

Force Main and
Septic
Retirement

Alternative Name:

Vacuum Sewer (Alternative 2)

Annual O&M		
Expense Item	Description	Annual Amount
Administrative/Office	Office	\$16,000.00
Supplies	Supplies and Equipment	\$46,000.00
Other	Other Operating Expenses	\$6,500.00
Contract Waste Treatment	Contracted Services	\$100,000.00
Repairs/Maintenance	Repairs and Maintenance	\$108,000.00
Salaries/Benefits	Salaries and Related Expenses	\$255,000.00
Insurance	Insurance	\$2,500.00
Utilities	Utility Costs	\$40,000.00
	Total:	\$573,500.00

Annual O&M

Annual O&M costs are calculated through a combination of increasing the existing Tilghman District O&M costs by a proportional percentage of growth from the additional 104 lots plus the 20 stubbed out undeveloped lots. This is also combined with costs specific to this alternative. The total O&M costs are representative of the sewer extension only and do not reflect any existing costs. The total number shown should be considered as additional costs to the Tilghman District associated with the sewer extension project. Per-lift-station annual electricity costs are calculated as \$19.5/year/ERC for the vacuum sewer system. Due to the need for 2 vacuum stations, the cost/ERC used is \$40/year.

Alternatives Considered - Project Costs

System Component Type:

Collection

System Component Name:

Force Main and Septic Retirement

Alternative Name:

Vacuum Sewer (Alternative 2)

Construction Costs		
Item	Description	Cost
Development (Construction)	Road and Utility Restoration Allowance	\$15,000.00
Development (Construction)	2" Force Main 9,500 LF	\$360,000.00
Development (Construction)	3" Force Main 8,350 LF	\$315,000.00
Development (Construction)	4" Force Main 3,860 LF	\$205,000.00
Development (Construction)	Mobilization	\$395,000.00
Development (Construction)	County Road Pavement Restoration	\$220,000.00
Development (Construction)	Service Line	\$315,000.00
Development (Construction)	Pump Station (2)	\$1,700,000.00
Development (Construction)	Traffic Control	\$35,000.00
Development (Construction)	Sediment Control	\$75,000.00
Development (Construction)	Abandonment of Ex Tanks	\$660,000.00
Development (Construction)	Driveway Trench Repair	\$100,000.00
Development (Construction)	Residential Restoration Allowance	\$156,000.00

Alternatives Considered - Project Costs

	Total Construction	\$4,551,000.00
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Non Construction Costs		
Item	Description	Cost
Legal Services	Administration and Legal	\$175,000.00
Architectural, Engineering & Planning	Engineering Planning & Design	\$385,000.00
Engineering - Construction Administration	Construction Phase Services (CM, CI, & Construction Design Services)	\$530,000.00
Contingencies	Contingency	\$910,000.00
	Total Non Construction	\$2,000,000.00

Project Cost

The budget reflects rough costing for the full septic elimination of Fairbank and Bar Neck. The soft costs associated with engineering, design, planning, construction services, legal, and administrative services are based on MDE guidelines seen below (Soft Cost Guidelines). The contingency is at 20% of construction costs due to the numerous potential construction problems identified in this alternative which could present a change order or cost adjustment during the construction phase.

Soft Cost Guidelines**MINIMUM FUNDING PARTICIPATION REQUIREMENTS
FOR ENGINEERING SERVICES (A/E) CONTRACT**

Except for Enhanced Nutrient Removal (ENR) and some jointly funded projects, payments for A/E services may not be processed by MDE until the bids for the construction contract are opened and the construction procurement package (aka Part B) is approved by MDE. The grant/loan recipient must ensure that the A/E contract meet the Minimum Funding Participation Requirements if s/he anticipates that the contract will be funded by MDE, even when actual reimbursements may occur later when funds are awarded. Contracts that do not meet the Minimum Funding Participation Requirements will not be funded even if they are eligible, and even if State funds are available.

The grant/loan recipient may request MDE review of the engineering contract to ensure that it meets the Minimum Funding Participation Requirements, even when the contract will not be funded immediately. The following items need to be part of the engineering contract:

1. Type of Contract (lump sum, cost plus fixed fee, etc.)
2. Documentation of the RFP or other competitive process. No new RFP is required if the planning engineer is continuing with the design, or if the design engineer is retained to provide only design services during construction.
3. Documentation of the MBE/WBE steps by both the grant/loan recipient and the selected engineer.
4. The scope and extent of the work to be performed
5. The time frame or schedule of performance
6. Cost breakdown (labor, overhead, profit, etc.)
7. Payment provisions including billing periods
8. Access to audit records clause
9. Extent of subcontracting

Grant/Loan Fund Limitations:

Grant and/or loan funding will be limited to the reasonable price as determined below:

Planning and Design Services:

Design Only % = $6.4761 \times (\text{Est. Const. Cost in \$M})^{-0.1211}$

Planning & Design % = $10.364 \times (\text{Est. Const. Cost in \$M})^{-0.1457}$

Construction Management, Inspection, and Design Services during Construction:

For construction cost less than \$10 million:

Construction Phase Services % = $14 - (0.62 \times \text{Const. Cost in \$M})$

For construction cost of \$10 million or more

Construction Phase Services % = 8%

Revised 8/17/17

Alternatives Description Details	
System Component Type:	Collection
System Component Name:	Force Main and Septic Retirement
Description	
Alternative Name:	Conventional Sewer (Alternative 3)
Is this alternate solution feasible or is it not feasible?	
Feasibility	✓ Yes

Conventional Sewer History

The benchmark for sewer options is the conventional gravity sewer. Sewers have been around for more than 2,000 years. Conventional sewer systems are the simplest of sewer technologies in that they are based on the use of underground pipes laid at a slope sufficient to move water and solids from a point at which they are generated to a discharge which until only times was a river or stream. Treatment facilities have only been around for about 200 years. For most of sewer history sewer pipe was made of whatever local materials would allow. Early sewers were mostly brick, clay, stone, and even wood. Underground sections were built in a doghouse shaped cross section. In the recent 150 years many new pipe materials were introduced including cast iron, asbestos-cement, concrete, plastic, and many others. Concern developed for the effects of untreated wastewater discharges to watercourses including the need to keep sewer flow within the collection pipes, the exclusion of groundwater/stormwater, and sewer waste treatment. Modern sewer pipe is light, durable, watertight, and corrosion resistant. The engineering requirements for sewer systems are well developed and documented.

Conventional Sewer Concerns

Gravity flow sewers are the standard for sewer construction. Modern sewer systems are low tech, easily maintained, trouble free, and serviceable for many decades. A downside of the technology is that in places like Fairbanks and Bar Neck where the elevation is low and the terrain flat the depth of the sewers can become excessive and costly to maintain the required slope to keep sewage flowing. An additional downside is the size of the sewer pipes as opposed to the small diameter of STEP and grinder pump systems. The larger pipes can be an incentive to homeowners with surface drainage or flooding problems to connect storm sewers to the sanitary system. The surveillance of underground pipe installations in the communities and the enforcement of sewer use ordinance ordinances can be difficult politically. In the project area it is likely that at least one formal pump station will be required to minimize the sewer depth upstream of the pump station and to raise the pipe depth to an elevation to connect to the existing Tilghman Island gravity sewer system. A further gravity sewer design accommodation of the elevation, and flatness of the project area will be the need to assure the water tightness of manholes and manhole covers.

The Advantages

- Simplicity of design and operation
- Minimal electro-mechanical requirement (simple pump stations)
- Robust (pump stations have back up power and redundant components)
- Low energy requirement
- Remote monitoring (only at pump stations)
- Minimal maintenance (as opposed to other sewer types)
- Equipment and operating methods are readily available and interchangeable among manufacturers, suppliers, equipment operators, etc.

The Disadvantages

- Construction complexity (sewers in narrow roadways)
- Difficulty accommodating vehicle passage at construction locations
- May require 2 pump stations (one for Fairbanks and one for Bar Neck) or more
- Construction may be impossible in the late winter early spring due to high groundwater and saturated soils that become plastic and sticky
- Long runs of sloped sewer pipelines may require deep excavations that require dewatering and create safety concerns for workers
- Deep sewer trench excavations increase roadway reconstruction effort and cost.
- Deeper and wider sewer trenches increase sediment and erosion control effort and cost
- Management of spoil during roadway trenching and at the construction staging area may damage existing drainage ditches
- Lateral sewer connection design and construction may be difficult for the following reasons:
 - Individual house sewer/new sewer intersection can be difficult due to blockage by structures or the proximity of property lines.
 - All properties to receive sewer service also have wells and it may be difficult or impossible to maintain the required separation between the new sewer and the well on the property served or the neighboring property.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Conventional Sewer (Alternative 3)		

General Design Criteria

Septic systems in the project area are subject to the requirements of COMAR and The Critical Area regulations. Many if not most of the existing septic systems are aged and exempt from the regulation requirements unless and until they discharge septic tank effluent to the ground surface (defined as failure) or require septic tank replacement. Septic system repair or replacement requires a permit from the County Health Department. Many of the properties in the project area lie within the Critical Area thereby necessitating that BAT systems be used when these systems are repaired or replaced. BAT septic systems are miniature septic tank effluent treatment systems that are designed to reduce the nitrogen in the system effluent. BAT septic systems are manufactured by any of several companies whose systems have been approved by the Department of the Environment.

- i. Conventional sewers are feasible but must overcome several engineering obstacles including:
 - 1. The flat terrain and low elevation suggest that deep trenches are likely to be required thereby requiring dewatering, select backfill, and the management of excavated soil.
 - 2. High groundwater is likely to restrict construction and require trench dewatering during the mid-winter to spring seasons.
 - 3. Deep excavations may require the sewer to be located to the side of the narrow roads in order to permit loadout of the excavated spoil and its replacement.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Conventional Sewer (Alternative 3)		

Map of Existing and Proposed Areas

The map below shows the existing Region V sewer system serving Tilghman and the proposed sewer extension to the villages of Fairbank and bar Neck.



- SixInch/SixInchImagery
- C-PROP-8" MAIN
- C-PROP-10" MAIN
- Project Properties
- Proposed Residential Con...



System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Conventional Sewer (Alternative 3)		

Elevation

The entire project area is no more than 7ft. above mean sea level with many areas that are four, five, and six feet. The low flat elevation makes the project area vulnerable to the effects of sea level rise and storm surge. In the near term (through 2050) the major effects are likely to be due to storm surge. In the long run climate induced sea level rise will exacerbate storm surge. Storms such as hurricane Isabel in 2013 will flood the entire project area. The flooding that accompanies storm surge and sea level rise will affect existing septic systems by promoting the release of septic tank effluent to the surface along with bacteria, nitrogen, and phosphorous. Any release of sewage to the surface endangers human health.

Topography

The flat topography of the project area creates a septic system design, repair and construction challenge. The flat land surface, soils with slow percolation, and poor storm drainage prevent the construction of septic systems that comply with COMAR standards. Repairs require design accommodations that may or more likely will not correct septic system failure. Considering the high cost of septic system repair, homeowners must expend tens of thousands of dollars without a guarantee. The only corrective action for a septic system that is in disrepair or failed is to convert the septic tank to a holding tank and have the contents pumped weekly at a cost around \$500. The approximately \$26,000 annual cost is greater than most property owners can afford.

Soils

Most of the project area soils are Keyport silt loam. The soil is almost rock hard in the dry summer season and sticky and plastic when wet. In the early spring the soil is saturated at 20 inches depth. The need to support an excavation, such as for the septic tank, very much depends on ground conditions. Slow seeps of water into excavations will necessitate the removal of accumulated water. The water will be muddy making adherence to erosion and sedimentation requirements difficult. During the wet season soil plasticity may limit the use of backhoe, dump trucks, and septic tank delivery/placement truck.

Storm Drainage

There is no formal storm drainage in the project area. What drainage there is, is limited to roadside ditches which become choked with grass and brush growth. These ditches are cleaned periodically by the County. The flat topography and ditch vegetation create numerous areas of low-level flooding.

Alternatives Considered - Environmental Impacts

The poorly drained flooded areas extend the “wet season” which is generally the period between late January and mid-April. It is common in residential areas for homeowners to attach storm and roof drains to the sewer to address surface drainage problems thereby aggravating soil and surface drainage problems.



Overgrown Drainage Ditch

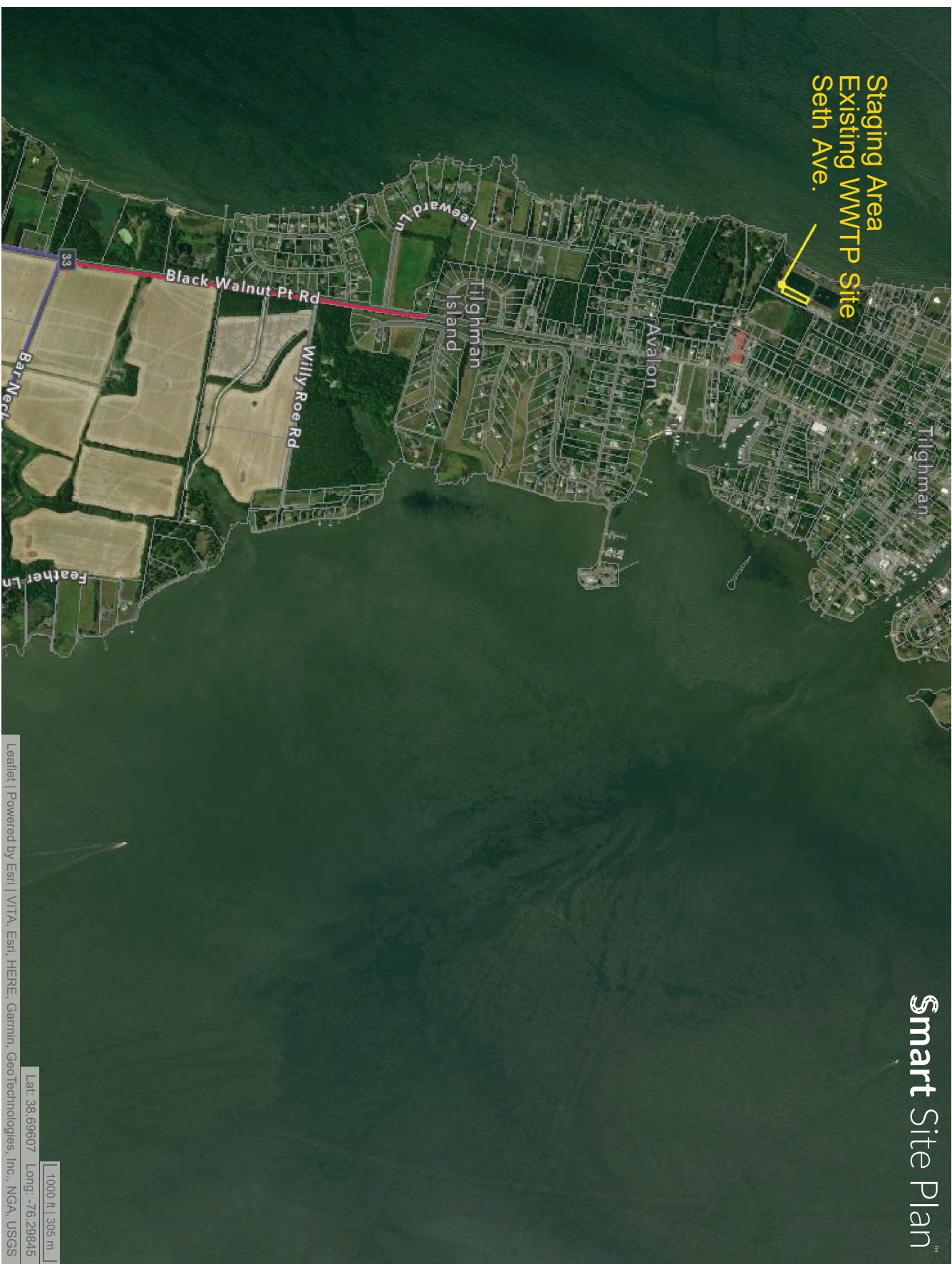


Ditch Clearing

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Conventional Sewer (Alternative 3)		

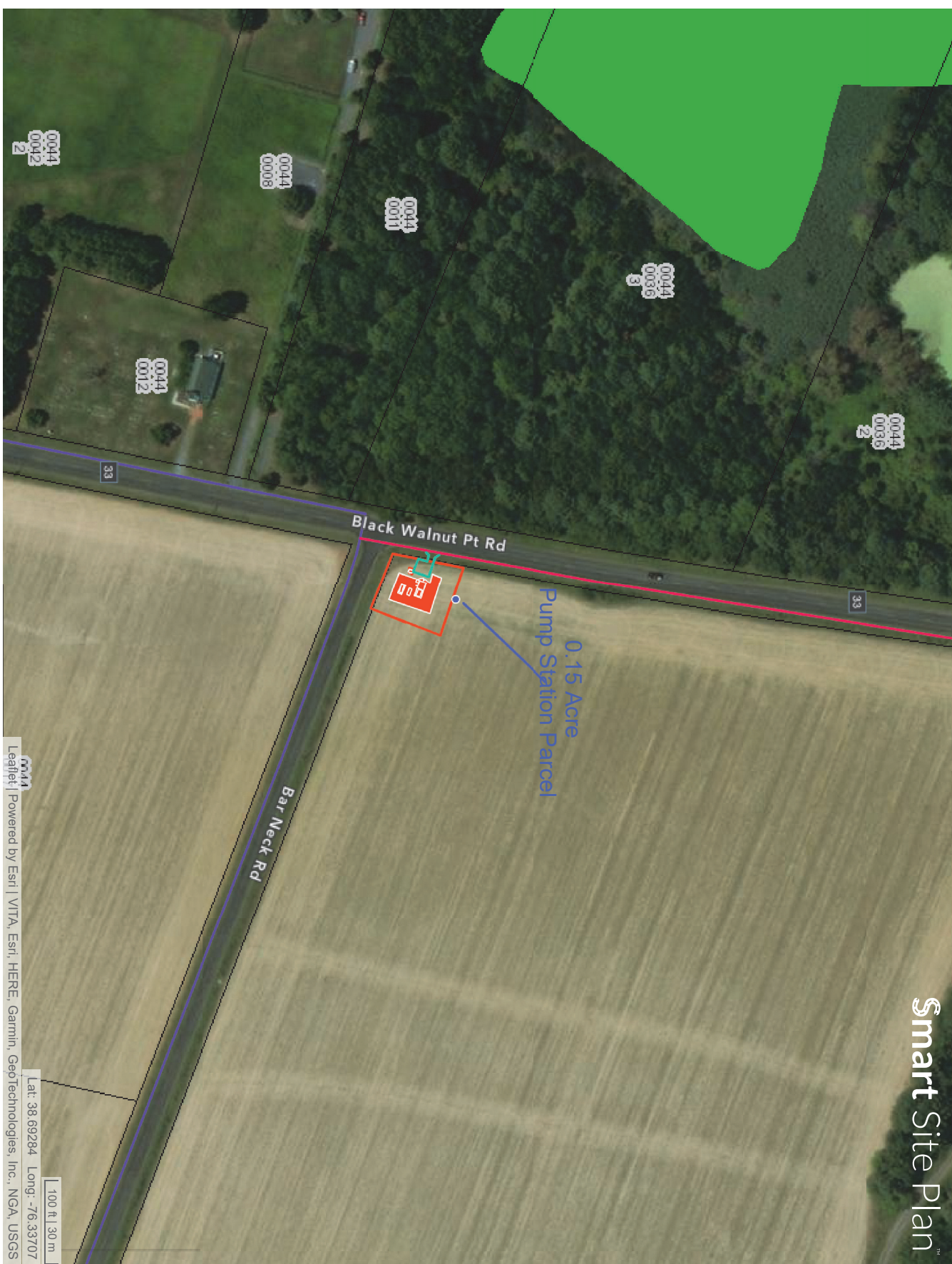
Construction Staging, Spoil and Stockpiling Areas

The installation of gravity mains will require at least one staging area for materials and equipment. Construction staging areas may be along Black Walnut Point Road and Bar Neck Road. These locations will be occupied by the equipment, plumbing materials, minor construction materials, and any tools or vehicles which will be needed for the project. Any materials or equipment not in use will be staged at the Tilghman Island wastewater treatment plant. which is on Seth Avenue. The site will be restored, and any temporary disturbances will be remediated through minor fill material placement and fescue seeding if necessary.



Pump Stations

Due to the terrain and the nature of traditional gravity systems, installing a gravity main will require at least 1 pump station. This means that the County may need to secure a parcel of land on which to install the pump stations. The County does not currently own any additional land along the proposed runs of gravity sewer mains. One site considered would require a parcel be subdivided and sold to the County. This site is along Route 33 on Parcel 21 and is in an ideal location to accomodate the collection system.



System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Conventional Sewer (Alternative 3)		

Overview

- i. Conventional sewers are feasible but must overcome several engineering obstacles including:
 - 1. The flat terrain and low elevation suggest deep trenches will be required thereby requiring dewatering, select backfill, and the management of excavated spoil
 - 2. High groundwater is likely to restrict construction and require trench dewatering during the mid-winter to spring seasons
 - 3. Deep excavations may require the sewer to be located to the side of the narrow roads in order to permit loadout of the excavated soil and its replacement
 - 4. Management of heavily silted and/or sewage contaminated water requires specialized methods.
 - 5. Management of sewerage contaminated water may require permits.
 - 6. Most of the roads in the project area are little more than lane with a travel width less than 15 feet. Maintenance of a usable travel way to repair, maintain, or replace existing septic systems will be difficult.

Saturated Soils

The need to support an excavation, such as for the septic tank and the decommissioning of the existing, very much depends on ground conditions. Slow seeps of water into excavations will necessitate the removal of accumulated water. The water will be muddy making adherence to erosion and sedimentation requirements difficult. During the wet season soil plasticity may limit the use of backhoe, dump trucks, and septic tank delivery/placement truck. Groundwater seeps into excavations for the removal or demolition of existing septic tanks will require implementation of sanitary methods. The project design should provide guidance to contractors on how to accomplish this work.

Residential Lot Restoration

Each sewer extension connection installed on a residential lot will require excavation and disturbance to the homeowner landscaping. The contractor will provide backfill, grading, and other necessary tasks to restore earthwork on site to landscape-ready condition. This approach will require lot restoration to be coordinated with the homeowner. Having a uniform approach for each and every homeowner will inevitably cause some homeowners to be unhappy with lot restoration and landscaping conducted by the County and their contractors. With this understanding, it is recommended that there be a residential site restoration allowance of \$1,500 per residence allotted to the homeowner to secure their preferred landscape restoration professional to restore the site to the

Alternatives Considered - Potential Construction Problems

satisfaction of the homeowners. This suggestion is included in the estimated project budget as a total sum of \$156,000 which allows for the \$1,500 per lot at 104 lots.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Conventional Sewer (Alternative 3)		

Energy Efficiency

Conventional sewers provide electrical cost savings due to their reliance on gravity to convey wastewater across the majority of the collection system. Some of the benefits of gravity sewer and its reduction of electrical demand are minimized in flat terrain like that of the project area. The required slope of the gravity system requires that a lift station be installed between the extended service area and the existing gravity manhole at the southern portion of the existing sewer service area. However, once the gravity system is installed, it requires very little maintenance and almost all O&M costs are related to pump station maintenance. Survey data will be needed to establish required pump size, pump curves, and overall pump station efficiency.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Conventional Sewer (Alternative 3)		

Pumping Station

Green infrastructure is a cost-effective, resilient approach to managing wet weather impacts that provides many community benefits. While single-purpose gray stormwater infrastructure, conventional piped drainage, and water treatment systems is designed to move urban stormwater away from the built environment. Green infrastructure reduces and treats stormwater at its source while delivering environmental, social, and economic benefits. The proposed pumping station building will incorporate rooftop and non-rooftop disconnects to promote groundwater recharge adjacent to the impervious area associated with the pumping station. The practice of using rooftop and non-rooftop disconnects is encouraged by the Environmental Protection Agency (EPA). There are no plans or need for rainwater harvesting at the pump station.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Conventional Sewer (Alternative 3)		

Wells

All properties in the project area are served by on site well water supplies. Although an on the ground survey of the proximity of wells and septic systems in the project area was not performed, from a drive by perspective it is difficult to envision an arrangement of wells and septic systems that provide sufficient separation.

Longevity

Gravity flow sewers are the standard for sewer construction. Modern sewer systems are low tech, easily maintained, trouble free, and serviceable for decades. Once constructed, this gravity system could provide reliable and low maintenance to the project area.

Growth

A sewer solution to the Fairbanks Bar Neck communities will increase the incentive for land development by removing the current disincentives associated with wastewater management. Presently, development is focused in the nearby Tilghman Island community because it is served by municipal sewer. A sewer solution for Fairbanks and Bar Neck would connect these communities to the Tilghman Island sewer system. The Fairbanks Bar Neck area currently provides some of the most affordable residential real estate in this area of Talbot County. Sewer associated development would allow much higher residential density than would be allowed under current land use regulations. The value of the tradeoff where reduced health and environmental risk is achieved in return for higher density development is difficult to quantify.

Collection

System Component Name:

Force Main and
Septic
Retirement

Alternative Name:

Conventional Sewer (Alternative 3)

Annual O&M		
Expense Item	Description	Annual Amount
Repairs/Maintenance	Repairs and Maintenance	\$112,000.00
Utilities	Electrical Costs	\$35,000.00
Other	Other Operating Expenses	\$7,000.00
Salaries/Benefits	Salaries and Related	\$255,000.00
Administrative/Office	Office	\$16,000.00
Contract Services - Other	Contracted Services	\$100,000.00
Insurance	Insurance	\$2,500.00
Supplies	Supplies and Equipment	\$46,000.00
	Total:	\$573,500.00

Annual O&M

Annual O&M costs are calculated through a combination of increasing the existing Tilghman District O&M costs by a proportional percentage of growth from the additional 105 lots. This is also combined with costs specific to this alternative. The total O&M costs are representative of the sewer extension only and do not reflect any existing costs. The total number shown should be considered as additional costs to the Tilghman District associated with the sewer extension project. Per-lift-station annual electricity costs for a similar number of ERCs are \$40/year/ERC for a gravity sewer.

Alternatives Considered - Project Costs

**System Component
Type:**

Collection

**System Component
Name:**

Force Main and
Septic Retirement

Alternative Name:

Conventional Sewer (Alternative 3)

Construction Costs

Item	Description	Cost
Development (Construction)	Restoration	\$15,000.00
Development (Construction)	County Road Pavement Restoration	\$220,000.00
Development (Construction)	Mobilization	\$251,725.00
Development (Construction)	8"&10" Gravity Main 18,500 LF	\$1,540,000.00
Development (Construction)	Traffic Control	\$35,000.00
Development (Construction)	Restoration Allowance	\$156,000.00
Development (Construction)	Cleanouts and Install	\$200,000.00
Development (Construction)	Service Line	\$55,000.00
Development (Construction)	Abandonment of Ex Tank	\$660,000.00
Development (Construction)	Pump Station	\$850,000.00
Development (Construction)	Sediment Control	\$75,000.00
Development (Construction)	Driveway Trench Repair	\$100,000.00

	Total Construction	\$4,296,000.00
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Non Construction Costs		
Item	Description	Cost
Architectural, Engineering & Planning	Engineering Planning & Design	\$400,000.00
Contingencies	Contingency	\$860,000.00
Legal Services	Administration and Legal	\$175,000.00
Engineering - Construction Administration	Construction Phase Services (CM, CI, & Construction Design Services)	\$550,000.00
	Total Non Construction	\$1,985,000.00

Project Cost

The budget reflects rough costing for the full septic elimination of Fairbank and Bar Neck. The soft costs associated with engineering, design, planning, construction services, legal, and administrative services are based on MDE guidelines (Soft Cost Guidelines). The contingency is at 20% of construction costs due to the numerous potential construction problems identified in this alternative which could present a change order or cost adjustment during the construction phase.

Alternatives Description Details	
System Component Type:	Collection
System Component Name:	Force Main and Septic Elimination
Description	
Alternative Name:	Grinder Pump Systems (Alternative 4)
Is this alternate solution feasible or is it not feasible?	
Feasibility	✓ Yes

Centralized Sewer History

The benchmark for sewer options is the conventional gravity sewer. Sewers have been around for more than 2,000 years. Conventional sewer systems are the simplest of sewer technologies in that they are based on the use of underground pipes laid at a slope sufficient to move water and solids from a point at which they are generated to a discharge location that until recent times was a river or stream. Treatment facilities have only been around for about 200 years.

For most of sewer history sewer pipe was made from whatever local materials would allow. Early sewers were mostly brick, clay, stone, and even wood. Underground sections were built in a doghouse shaped cross section. In the recent 150 to 200 years many new pipe materials were introduced including cast iron, asbestos-cement, concrete, plastic, and many others. Concern developed and intensified over the years for the need to treat wastewater discharge, the need to prevent infiltration/exfiltration, and the need to exclude stormwater. Modern sewer pipe is light, durable, watertight, and corrosion resistant. The engineering requirements for sewer systems are well developed, documented, and readily available via the world wide web.

Grinder Pump System Overview

Grinder Pump systems were developed to get the advantages of small diameter sewers and get rid of the septic tank. These objectives were met by the introduction of grinder/positive displacement pump combinations along with small diameter sewers. The technology works but it has its limitations. Influent grinders are a common component of municipal wastewater treatment systems. Grinders are intended to chop solid material in sewerage into small pieces to protect downstream treatment components from damage should materials not meant to be in sewers be present. Grinding is also intended to facilitate the digestion of solids in biological treatment processes. Solids in sewers can be a problem. Where grinder pumps are installed at wastewater treatment plants, they are usually a high maintenance component. When used to treat municipal sewerage, the grinders used are specified for industrial duty. In grinder pump sewers with many small residential grade grinder pumps, maintenance and service can be a headache. Grinder pumps often do not get the level of maintenance and service that should be provided. According to R. C. Worst Co. the average service life of a residential grinder pump is 2-3 years whereas a commercial grinder pump has an average life of 3-6 years. A residential high head effluent pump has a service life of 8 to 15

years. Further, the small size of the grinder pump pit requires more rapid service response times than conventional sewers or STE-STEP systems.

Sewer systems are expensive to construct and maintain. The life expectancy of PVC and PE sewers is expected to be 100 years and more if their hydraulic design is not exceeded. During a grinder pump's sewer service life, the primary maintenance focus is the grinder pump. A budget cost for the change out of a grinder pump can exceed \$2,000 adding more than \$650 to the annual sewer fee. A second maintenance concern is pipe plugging which is almost never considered in the design of the sewer network. Pressure cleanouts are typically specified for pipe cleaning. Clearing pipe blockage using air pressure is generally of no help. Once an opening in the blockage is achieved the pressure plunges and the process loses the ability to fully clear the obstruction. A pigging system is the only process that should be required to enable periodic cleaning of the sewers. Adding pigging capability to a grinder pump sewer will add significant cost.

Grinder Pump Considerations

Grinder Pump technology is a modern process that presumably is a cost-effective alternative to the conventional gravity sewer. Installation costs are lowered by using small diameter pipe and no-dig sewer construction. Grinder pump and STEP systems are comparable in that they both pump wastewater into a small diameter pressurized sewer. These technologies are not comparable with conventional sewer or vacuum sewer technologies. The following table compares STEP sewer systems to Grinder pump tech.

STE-STEP	Grinder Pump
Septic tank removes solid material plus grease and oil prior to pumping it into a pressurized sewer network	Grinder pump chops solids to small pieces to create a slurry to be pumped into a pressurized sewer network. Potential fouling and blockage of sewer main is greater than STE-STEP
On-lot installation cost \$3,500 to \$5,000 From Modern Plumbing Today	On-lot installation cost \$3,000 to \$6,000 From Askinglot.com
Pump replacement cost \$400 to \$600 From Askinglot.com	Pump replacement cost \$2,000 to \$3,000 From Askinglot.com
Pump life expectancy 8-15 years (high head) Source R. C. Worst Co.	Pump life expectancy 2-3 Years Source R. C Worst Co.
Most other points of comparison are the same for both systems	

Fairbank & Bar Neck Grinder Pump System

The size of the service area in the Fairbanks and Bar Neck neighborhoods is ideal for Grinder systems. Grinder pump systems employ a small (as opposed to the septic tank in a STEP system) plastic or fiberglass tank with a specialized pump. The pump macerates sewage converting it into a slurry that is pumped to a wastewater treatment systems or larger sewer network. The collection tank can be fabricated and installed to be watertight and flood resistant making the systems suitable for low lying areas. The sewer piping is most often 2 inch in diameter although in special circumstances smaller or larger diameters can be used. The small diameter of the sewer pipes makes these systems amenable to no-dig technologies thereby minimizing excavation and reducing installation costs.

Alternatives Considered - Description

Grinder pump with pressure sewers is a relatively new method for wastewater conveyance. The technology was invented to minimize the need for deep sewer trench excavation and the associated high cost.

System Component Type: Collection

System Component Name: Force Main and
Septic Retirement

Alternative Name: Grinder Pump Systems (Alternative 4)

Grinder Pump System Overview

GPSDS systems are similar to STEP systems except for the following factors which are, tank size, service response time, pump type, maintenance, and construction complexity. Most grinder pump systems employ a factory assembled grinder pump and receiving tank. Controls and electric components are also provided. The top of the grinder pump tank can be set even with the surrounding grade or elevated in areas subject to flooding. Venting for the grinder pump tank can be either direct to the tank itself or via the house sewer and plumbing stack vent above the roof. The design of the grinder pumps themselves varies considerably from manufacturer to manufacturer. Selection of a grinder pump should include a thorough evaluation of the features of the various pumps including grinder durability, pump type and operating characteristics, and service requirements. Each residential lot will be served by its own grinder pump. For immediate connection, 104 developed lots would be connected to the system via grinder pump stations and would require septic tank elimination. 20 additional lots would have stub outs for future service.

Grinder Pump Considerations

The typical pump in grinder pump systems is designed to chop any solid matter in the raw wastewater into fine bits and pieces which mixed with the accompanying water becomes a slurry. The grinder portion of the pump is separate from the slurry pump. Seasoned wastewater treatment operators will agree that the grinder is the weakest link in the grinder pump process. The design of grinder pump systems should include a thorough evaluation of grinder pump components and interviews with operators of various system. Grinder pumps require minimal maintenance on an individual basis but collectively as a system the maintenance requirement can be substantial. Each pump installation should be removed and inspected annually. Observed wear and damage should be repaired at the time of the annual inspection. The grinder pump tank should be cleaned during the annual service call.

Grinder Pump System Limitations

Following is a list of materials that should not be released into the house sewer which utilizes a grinder pump system. According to the WSSC (Washington Suburban Sanitary Commission) the forbidden list includes:

- Grease (a byproduct of cooking that comes from meat fats, oils, shortening, butter, margarine, food scraps, sauces and dairy products);
- Explosive or flammable material;
- Kitty Litter;
- Aquarium gravel;
- Strong Chemicals or toxic, caustic or poisonous substances;

- Degreasing solvents;
- Diapers, feminine products, or cloth of any kind;
- Fuel or lubricating oil, paint thinner or antifreeze;
- Plastic objects; and
- Seafood Shells.

The disposal of any of these items down the sewer of any type is generally not advised but several of these items can be particularly detrimental to a grinder pump system.

Specific Alternative Criteria

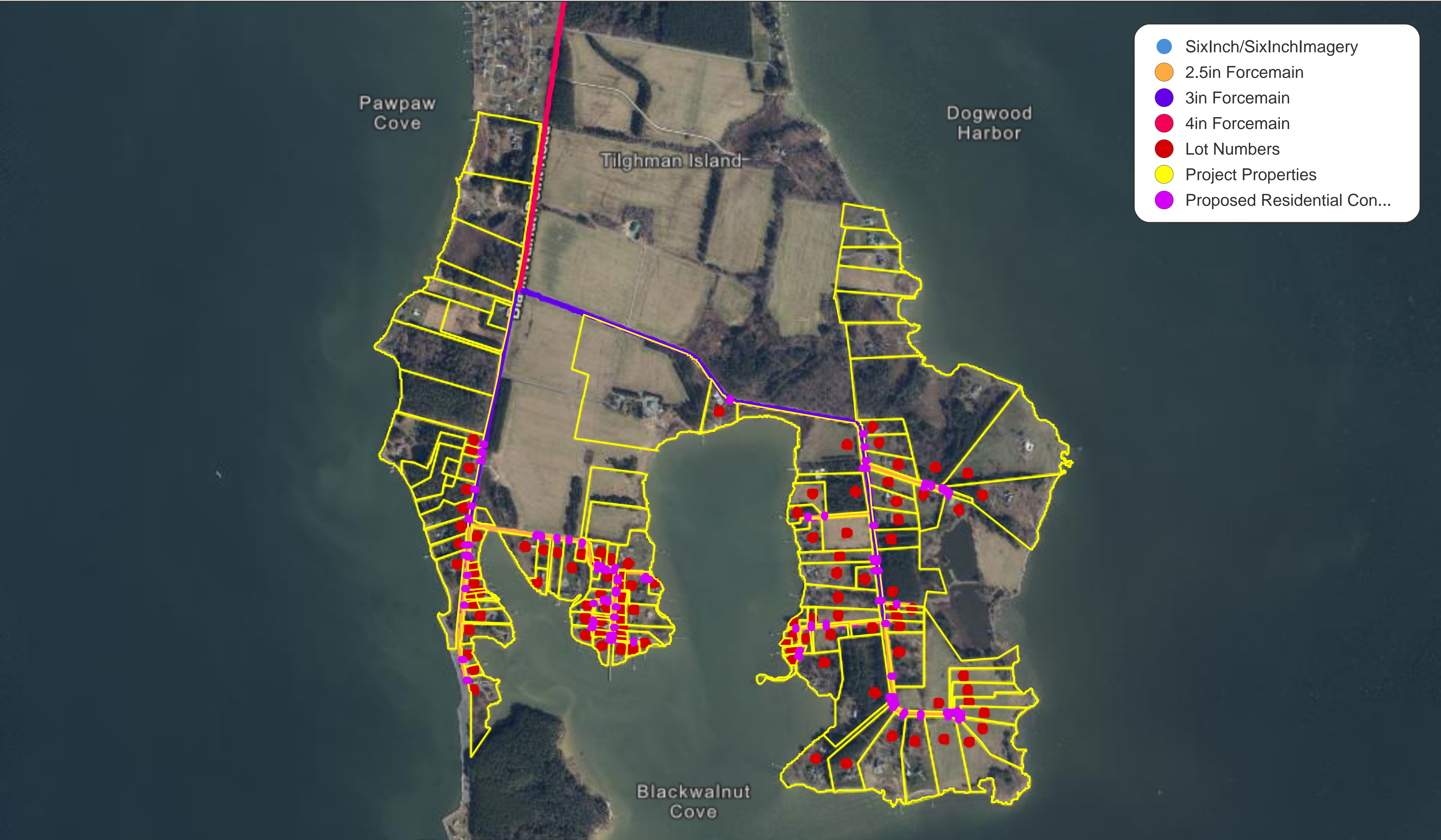
- i. The distinguishing characteristics of grinder pump sewer systems are;
 1. The pump pits are small (about 50 gallons volume) requiring less excavation.
 2. Like the STEP system grinder pump systems use small diameter plastic sewer pipes that allow trenchless installation.
 3. Grinder pumps are at least twice the cost of STEP pumps.
 4. Grinder pumps have a service life that is much less than STEP pumps primarily because of the grinder component of the grinder pump.
 5. Grinder pumps require more frequent maintenance.
 6. Grinder pump pit's limited liquid capacity necessitates that there be rapid response to performance complaints.
 7. Service lateral installation for Grinder pump systems does not include the excavation volume required for septic tank installation. However, some heavy equipment traffic will be required. Wet season or rainy periods are likely to require the use of matting to minimize installation and existing tank decommissioning damage and facilitate site restoration.

Alternatives Considered - Map

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Grinder Pump Systems (Alternative 4)		

Map of Existing and Proposed Areas

Below is a map of the existing Region V sewer service area for Tilghman Island and the proposed service area extension to Fairbank and Bar Neck.



System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Grinder Pump Systems (Alternative 4)		

Health Improvement

Wastewater management in the project area is provided by septic systems of which do not conform to regulatory or engineering criteria and which are likely to fail during some portion of the year or during severe weather events. Septic system failure releases health and environmentally hazardous material to the local drains and the surrounding bay. A grinder pump system will eliminate the health and environmental hazards posed by septic systems. Grinder pump small diameter sewer systems are compatible with trenchless sewer construction. This advantage facilitates the maintenance of vehicular travel during construction, allows minimal disturbance of the stormwater ditch network, and reduces construction erosion and sedimentation management.

Elevation

The entire project area is no more than 7ft. above mean sea level with many areas that are four, five, and six feet. The low flat elevation makes the project area vulnerable to the effects of sea level rise and storm surge. In the near term (through 2050) the major effects are likely to be due to storm surge. In the long run climate induced sea level rise will exacerbate storm surge. Storms such as hurricane Isabel in 2013 will flood the entire project area. The flooding that accompanies storm surge and sea level rise will affect existing septic systems by promoting the release of septic tank effluent to the surface along with bacteria, nitrogen, and phosphorous. Any release of sewage to the surface endangers human health.

Topography

The flat topography of the project area creates a septic system design, repair and construction challenge. The flat land surface, soils with slow percolation, and poor storm drainage prevent the construction of septic systems that comply with COMAR standards. Repairs require design accommodations that may or more likely will not correct septic system failure. Considering the high cost of septic system repair, homeowners must expend tens of thousands of dollars without a guarantee. The only corrective action for a septic system that is in disrepair or failed is to convert the septic tank to a holding tank and have the contents pumped weekly at a cost around \$500. The approximately \$26,000 annual cost is greater than most property owners can afford.

Soils

Most of the project area soils are Keyport silt loam. The soil is almost rock hard in the dry summer season and sticky and plastic when wet. In the early spring the soil is saturated at 20 inches depth.

The need to support an excavation, such as for the septic tank, very much depends on ground conditions. Slow seeps of water into excavations will necessitate the removal of accumulated water. The water will be muddy making adherence to erosion and sedimentation requirements difficult. During the wet season soil plasticity may limit the use of backhoe, dump trucks, and septic tank delivery/placement truck.

Storm Drainage

There is no formal storm drainage in the project area. What drainage there is, is limited to roadside ditches which become choked with grass and brush growth. These ditches are cleaned periodically by the County. The flat topography and ditch vegetation create numerous areas of low-level flooding. The poorly drained flooded areas extend the “wet season” which is generally the period between late January and mid-April. It is common in residential areas for Alternatives Considered - Environmental Impacts homeowners to attach storm and roof drains to the sewer to address surface drainage problems thereby aggravating soil and surface drainage problems.



Drainage Ditch



Ditch Clearing

Environmental Impacts

Environmental impacts will be minimal. Small diameter force main can be installed without the need for deep trenching as required for conventional gravity systems. All disturbance from force mains will be temporary and mitigated upon completion. Sediment and erosion control is recommended during the temporary disturbances. While there are wetlands in the vicinity of this project, no disturbance temporary or permanent is proposed within any mapped wetlands. There are no mapped endangered species habitats located within the project area and no sites of archeological significance are known to exist within the area. There is no anticipated increase in impervious area as a result of this project.

Pawpaw
Cove

Dogwood
Harbor

Tilghman Island

Blackwalnut
Cove

- Estuarine
- Palustrine
- Riverine
- Estuarine
- Lacustrine
- Marine
- Palustrine
- Riverine
- Estuarine
- Lacustrine
- Marine
- Palustrine
- Riverine
- Wetlands - Polygon - Speci...
- Wetlands - Linear - Special...
- SixInch/SixInchImagery
- 2.5in Forcemain
- 3in Forcemain
- 4in Forcemain
- Lot Numbers
- Project Properties
- Proposed Residential Con...

Smart Site Plan™

ALTERNATIVE 4 - WETLANDS



SCALE 1" = 422 ft

DATE Mar 13, 2026

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Grinder Pump Systems (Alternative 4)		

Construction Staging, Spoil and Stockpiling Areas

Trenchless construction also reduces the area needed for a large construction staging area for a field office trailer, excess soil storage, equipment parking, and material laydown. The reduction in roadway excavation and staging area size will reduce sedimentation and erosion control design effort and construction compliance. Construction staging areas will be at each lot to be connected and along Black Walnut Point Road and Bar Neck Road for the sewer main installation. These locations will be occupied by the equipment, plumbing materials, minor construction materials, and any tools or vehicles which will be needed for the project. Any materials or equipment not in use will be staged at the Tilghman Island wastewater treatment plant, which is on Seth Avenue. The site will be restored, and any temporary disturbances will be remediated through minor fill material placement and fescue seeding if necessary.

Easements and ROWs

Easements will be necessary for each connection made and for the tanks installed on each connected lot. These will be acquired during the design phase of the project. The easements will serve to provide the County with access to install and service the grinder system tanks and the sewer connections. The County will also utilize existing rights of way along Black Walnut Point Road and Bar Neck Road for sewer main installation. In the preliminary design phase, 124 lots and connections have been identified as in need of easements and 18,500 LF of sewer main installed in existing ROWs.

Pump Stations

Grinder pumps allow the diameter of sewers to be reduced and accommodates no-dig technologies for sewer installation. Grinder pump small diameter technology may avoid the need for the large pump station(s) that is likely to be necessary for the gravity sewer option. A grinder pump system would convey sewerage to the Tilghman wastewater treatment plant via the gravity sewer along Route 33.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Grinder Pump Systems (Alternative 4)		

Roadways

The roads in the project area are best described as lanes that are less than 15 feet in width. It is likely that the small diameter collector sewers will be located within the road travel way. However, unlike conventional sewer construction, maintenance of vehicle passage during construction is considerably less difficult because no-dig technology is feasible using small diameter pipe. Road reconstruction during the wet season should be restricted because the high-water table will saturate the roadway fill. Vehicle traffic can produce a phenomenon known as pumping where repetitive wheel load pumps the water from the saturated groundwater level up into the shallow fill. The mix of water and soil can liquify (fail) and be displaced under wheel loads. The failed road surface accelerates the formation of potholes and settlement to the point where vehicles can become mired in the mud. Failed roadway reconstruction due to excessive settling, pothole formation, and soil liquefaction can be a safety hazard in that heavy emergency vehicle access may not be possible under the conditions described. Soil and erosion control due to sticky soil tracked on wheeled equipment and management of a soil stockpile and equipment lay down area will be challenge. In summary, the soils in the project area present civil design and construction challenges. Detail design should include experienced geotechnical soil evaluation. Construction Management should enforce design requirements.

Coordination and Scheduling

Due to the fact that this project requires cooperation from individual land-owners for each connection and system installation, there are bound to be uncooperative land-owners in the proposed service area. Obtaining easements, ROWs, and other coordination considerations with each and every land-owner can present a hurdle to the timely completion of this project especially considering the need to perform construction activities during dry seasons.

Lateral Sewer Connections

Individual house sewer/new sewer termination can be difficult or impossible to reach because it may be behind the house or there is insufficient room between the house and property line to extend the house sewer to the street main. All properties to receive sewer service also have wells and it may be difficult or impossible to maintain the required separation between the new sewer and the well on the property served or the neighboring property.

Solids

Solids in sewers can be a problem. Where grinder pumps are installed at wastewater treatment plants, they are usually a high maintenance component. When used to treat municipal sewerage, the grinders used are specified for industrial duty. In grinder pump sewers with many small residential grade grinder pumps, maintenance and service can be a headache. Grinder pumps often do not get the level of maintenance and service that should be provided. According to R. C. Worst Co. the average service life of a residential grinder pump is 2-3 years whereas a commercial grinder pump has an average life of 3-6 years. A residential high head effluent pump has a service life of 8 to 15 years. Further, the small size of the grinder pump pit requires more rapid service response times than conventional sewers or STE-STEP systems.

Residential Lot Restoration

Each sewer extension connection installed on a residential lot will require lot restoration to be coordinated with the homeowner. Having a uniform approach for each and every homeowner will inevitably cause some homeowners to be unhappy with lot restoration and landscaping conducted by the County and their contractors. With this understanding, it is recommended that there be a residential site restoration allowance of \$2,500 per residence allotted to the homeowner to secure their preferred landscape restoration professional to restore the site to the satisfaction of the homeowners. This suggestion is included in the estimated project budget as a total sum of \$156,000 which allows for the \$2,500 per lot at 104 lots. 20 additional lots would have 2" stub outs installed for future service. However, those lots would have minimal lot restoration required since no grinder pump stations would be installed.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Grinder Pump Systems (Alternative 4)		

Energy Efficiency

Utilizing grinder pumps can eliminate the need for a central pumping station with high electrical demand. This can provide cost savings to the County by eliminating the large electrical draw of a pump station and by connecting grinder pumps to each homeowner's electrical system. Energy usage for typical grinder pumps based on 250 GPD over the course of a year will total about 200 kwh per pump. This multiplied by 104 connections is 20,800 kwh/yr.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Grinder Pump Systems (Alternative 4)		

Green Infrastructure

There are no planned structures or pump stations which will increase impervious areas. There are no opportunities to utilize rooftop and non-rooftop disconnects in this alternative. All disturbances will be temporary. There will be no permanent impacts to any existing stormwater management practices.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	Grinder Pump Systems (Alternative 4)		

Maintenance and Expense

Sewer systems are expensive to construct and maintain. The life expectancy of PVC and PE sewers is expected to be 100 years and more if their hydraulic design is not exceeded. During a grinder pump’s sewer service life, the primary maintenance focus is the grinder pump. A budget cost for the change out of a grinder pump can exceed \$2,000 adding more than \$650 to the annual sewer fee. A second maintenance concern is pipe plugging which is almost never considered in the design of the sewer network. Pressure cleanouts are typically specified for pipe cleaning. Clearing pipe blockage using air pressure is generally of no help. Once an opening in the blockage is achieved the pressure plunges and the process loses the ability to fully clear the obstruction. A pigging system is the only process that should be required to enable periodic cleaning of the sewers. Adding pigging capability to a grinder pump sewer will add significant cost.

Community Planning

A sewer solution to the Fairbanks Bar Neck communities will increase the incentive for land development by removing the current disincentives associated with wastewater management. Presently, development is focused on the nearby Tilghman Island community because it is served by municipal sewer. A sewer solution for Fairbanks and Bar Neck would connect these communities to the Tilghman Island sewer system. The Fairbanks Bar Neck area currently provides some of the most affordable residential real estate in this area of Talbot County. Sewer associated development would allow much higher residential density than would be allowed under current land use regulations. The value of the tradeoff where reduced health and environmental risk is achieved in return for higher density development is difficult to quantify. The development incentive associated with the construction of sewer service to the project area will in the near future (through 2050) likely lead to the development of much of the farmland between the Tilghman Island community and the Fairbanks Bar Neck areas. The area’s natural beauty, the population exodus from the nearby large cities (Washington, Baltimore, and Philadelphia), and the increasing value of undeveloped land will drive the effort to develop Fairbanks, Bar Neck, Tilghman, and the area between Tilghman and Fairbanks Bar Neck. The Fairbanks Bar Neck neighborhoods will be gentrified and redeveloped with the loss of affordable housing.

Collection

System Component Name:

Force Main and
Septic
Retirement

Alternative Name: Grinder Pump Systems (Alternative 4)

Alternative 4

Grinder Pump Systems

Updated Annual O&M

Expense Item	Description	Annual Amount
Repairs/Maintenance	Grinder pump repairs, replacement parts, and field service	115,000
Contract Services, Other	Specialized support, emergency response, and electrical or controls service	45,000
Salaries/Benefits	Operations staff time, inspections, customer coordination, and service response	145,000
Supplies	Pump parts, floats, fittings, controls, and maintenance materials	30,000
Administrative/Office	Billing, records, management, and office overhead	15,000
Utilities	County side utility and controls costs	5,000
Insurance	Insurance	3,000
Other	Miscellaneous operating expenses	10,000
Residential Electric Cost	Homeowner electrical use for 104 grinder pump units	32,000

Total Annual O&M: 400,000

Annual O&M

Annual O&M costs are calculated through a combination of increasing the existing Tilghman District O&M costs by a proportional percentage of growth from the additional 104 lots. This is also combined with costs specific to this alternative. The total O&M costs are representative of the sewer extension only and do not reflect any existing costs. The total number shown should be considered as additional costs to the Tilghman District associated with the sewer extension project. An additional consideration not spelled out in the O&M costs as they do not impact the County budget, are the homeowner costs associated with electrical charges to run the pumps are \$45 per pump/homeowner. The total cost to the homeowners for electrical use across the full buildout of the system is \$4,700/year.

Alternatives Considered - Project Costs

**System Component
Type:**

Collection

**System Component
Name:**

Force Main and
Septic Retirement

Alternative Name:

Grinder Pump Systems (Alternative 4)

Construction Costs

Item	Description	Cost
Development (Construction)	Grinder tank/Pump/Controls	\$2,080,000.00
Development (Construction)	County Road Pavement Restoration	\$220,000.00
Development (Construction)	Restoration Allowance	\$260,000.00
Development (Construction)	3" Force Main 8,350 LF	\$315,000.00
Development (Construction)	4" Force Main 3,860 LF	\$205,000.00
Development (Construction)	Driveway Trench Repair	\$100,000.00
Development (Construction)	Sediment Control	\$75,000.00
Development (Construction)	Restoration	\$15,000.00
Development (Construction)	Traffic Control	\$35,000.00
Development (Construction)	2" Force Main 9,500 LF	\$360,000.00
Development (Construction)	Mobilization	\$438,000.00
Development (Construction)	Service Line	\$55,000.00
Development (Construction)	Abandonment of Ex Tank	\$660,000.00

Alternatives Considered - Project Costs

	Total Construction	\$4,818,000.00

Non Construction Costs		
Item	Description	Cost
Legal Services	Administration and Legal	\$200,000.00
Contingencies	Contingency	\$964,000.00
Architectural, Engineering & Planning	Engineering Planning & Design	\$430,000.00
Engineering - Construction Administration	Construction Phase Services (CM, CI, & Construction Design Services)	\$590,000.00
	Total Non Construction	\$2,184,000.00

Project Cost

The budget reflects rough costing for the full septic elimination of Fairbank and Bar Neck. The soft costs associated with engineering, design, planning, construction services, legal, and administrative services are based on MDE guidelines seen below (Soft Cost Guidelines). The contingency is at 20% of construction costs due to the numerous potential construction problems identified in this alternative which could present a change order or cost adjustment during the construction phase.

Alternatives Description Details	
System Component Type:	Collection
System Component Name:	Force Main and Septic Retirement
Description	
Alternative Name:	STE & STEP System (Alternative 5)
Is this alternate solution feasible or is it not feasible?	
Feasibility	✓ Yes

STEP System Overview

STE and STEP system sewers might be considered a transitional sewer technology wherein a sewer system is substituted for the soil disposal system (leaching fields, drywell, etc.) following septic tank treatment. STE or STEP sewers improve on the conventional sewer in that the solid material in sewerage is retained in a tank and liquid alone flows into the sewer. Without solids, conventional sewers can be installed at flatter slopes than conventional practice requires (1/8"/ft. vs 1/4"/ft for 4" diameter sewers). The flattening of the sewer slope is justified by the absence of solids in the wastewater flow. The flatter slope can be advantageous in areas like Tilghman Island where the flat terrain and high groundwater restrict deep excavation. STEP sewer system technology introduced the addition of a pump and small diameter plastic pipe to address adverse terrain, groundwater and soil obstacles to sewer design and construction. The STEP system allows small diameter sewers to be laid at shallow depth using no-dig technology. The discharge point for the STEP and all other alternative sewer systems that are evaluated in this PER will be a Tilghman sewer manhole in route 33 about a mile north of the junction between route 33 and Bar Neck Rd.

STE & STEP Considerations

STEP sewer system technology introduced the addition of a pump and small diameter plastic pipe to address adverse terrain, groundwater and soil obstacles to sewer design and construction. The STEP system allows small diameter sewers to be laid at shallow depth using no-dig technology. The discharge point for the STEP and all other alternative sewer systems that are evaluated in this PER will be a Tilghman sewer manhole in route 33 about a mile north of the junction between route 33 and Bar Neck Rd. The disadvantages of a conventional sewer system are addressed by a STEP sewer in the following ways:

Conventional Sewer	STE-STEP Advantage or Not
High construction difficulty with adverse soil, groundwater, narrow roads,	Sewers can be installed using directional drilling to minimize excavation and sewer trench depth.
Difficulty accommodating vehicle passage at construction locations.	Sewer installation using trenchless excavation minimizes road disruption and closures

Alternatives Considered - Description

May require 2 or more pump stations (one for Fairbanks and one for Bar Neck)	STE-STEP sewer design minimizes the need for pump stations. It may be possible to design the sewer network so that no pump stations are required aside from the STEP pumps at individual service connections.
Sewer construction may be impossible in the late winter early spring due to groundwater and other limiting soil characteristics.	Trenchless technology is not restricted by groundwater
Deep excavations for manhole and pump stations will be required.	There are no manhole requirements for STEP sewers.
Service connection installation may be restricted to the dry season to facilitate backhoe operation for pipe installation	Septic tank installation may be limited to the dry season to avoid groundwater complications and facilitate backhoe operation
May require significant roadway reconstruction and construction delay due to excavation width and depth high groundwater and soils.	If installed using trenchless technology and at shallow depth, STEP sewers minimize road damage, accelerate road repair
Difficult soil and erosion control	STEP systems minimize the volume of soil that must be managed thereby reducing erosion and sedimentation control effort
Narrow roadways may limit the volume of spoil that can be piled alongside the trench excavation. Management of spoil may lengthen the construction schedule.	STEP systems minimize the volume of soil that must be managed thereby reducing incursion into existing drainage systems
All properties to receive sewer service also have wells and it may be difficult or impossible to maintain the required separation between the new sewer and the well on the property served or the neighboring property.	Small diameter sewers and service connections can be sleeved within another larger pipe to provide a compromise solution to prevent well contamination

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	STE & STEP System (Alternative 5)		

General Design Criteria

Each residence served by a STEP system is required to have a large septic tank and pump chamber. The most common tank sizes are one thousand and one thousand five hundred gallons. The house sewer is connected to the septic tank. Often the tanks are divided into two chambers with 2/3rds capacity allocated to the first chamber and on third allocated to the second chamber. The second chamber is used to locate a submersible pump. Heavy solids in the incoming wastewater settle out in the first chamber and the settled wastewater conveyed to the second “pump” chamber. Other configurations for settling tank and pump chamber are possible. In the first chamber settling tank, solid organic matter is decomposed and liquified by anaerobic microorganisms. The arrangement of various baffles and pipes in the septic tank allow the liquified matter to flow to the pump chamber and pumped to the treatment plant. In addition to organic decomposition, the biological process produces several gasses that are objectionable to the normal person and are potentially explosive. These gasses are safely removed from the tank via the house sewer pipe which is connected to the plumbing vent stack. The vent stack extends from the basement or crawl space to and through the roof. The stack releases the objectionable gases to the atmosphere above the roof line.

Maintenance

The pump in STEP systems differs from grinder pumps in that it is not required to slurry the wastewater. Wastewater solids are retained in the first septic tank chamber. Like grinder pump systems, the septic pump pumps the sewage to the treatment system or existing collection system using small diameter pipes which, like grinder systems, are suitable for no-dig technologies. Even so, Septic tanks still require some basic maintenance, but one maintenance requirement is most important. Septic tanks must be pumped periodically. Standard pumping schedules are between 3 and 5 years.

Specific Alternative Criteria

- i. The defining characteristic of STE-STEP sewer systems is the installation and use of a septic tank at each property served. STE sewers drain to collection sewers that are identical to a conventional sewer layout. However there is one factor that provides a construction and performance advantage to STE sewers over the conventional sewer approach. That is that the septic tank retains any solids that flow from the building sewer thereby permitting a reduction in the minimum slope of the collector sewers in the roads. The tanks also reduce sewer maintenance. STE-STEP sewers are feasible if the system designers come up with a practical

method to retire and dispose of existing septic tanks and install replacements.

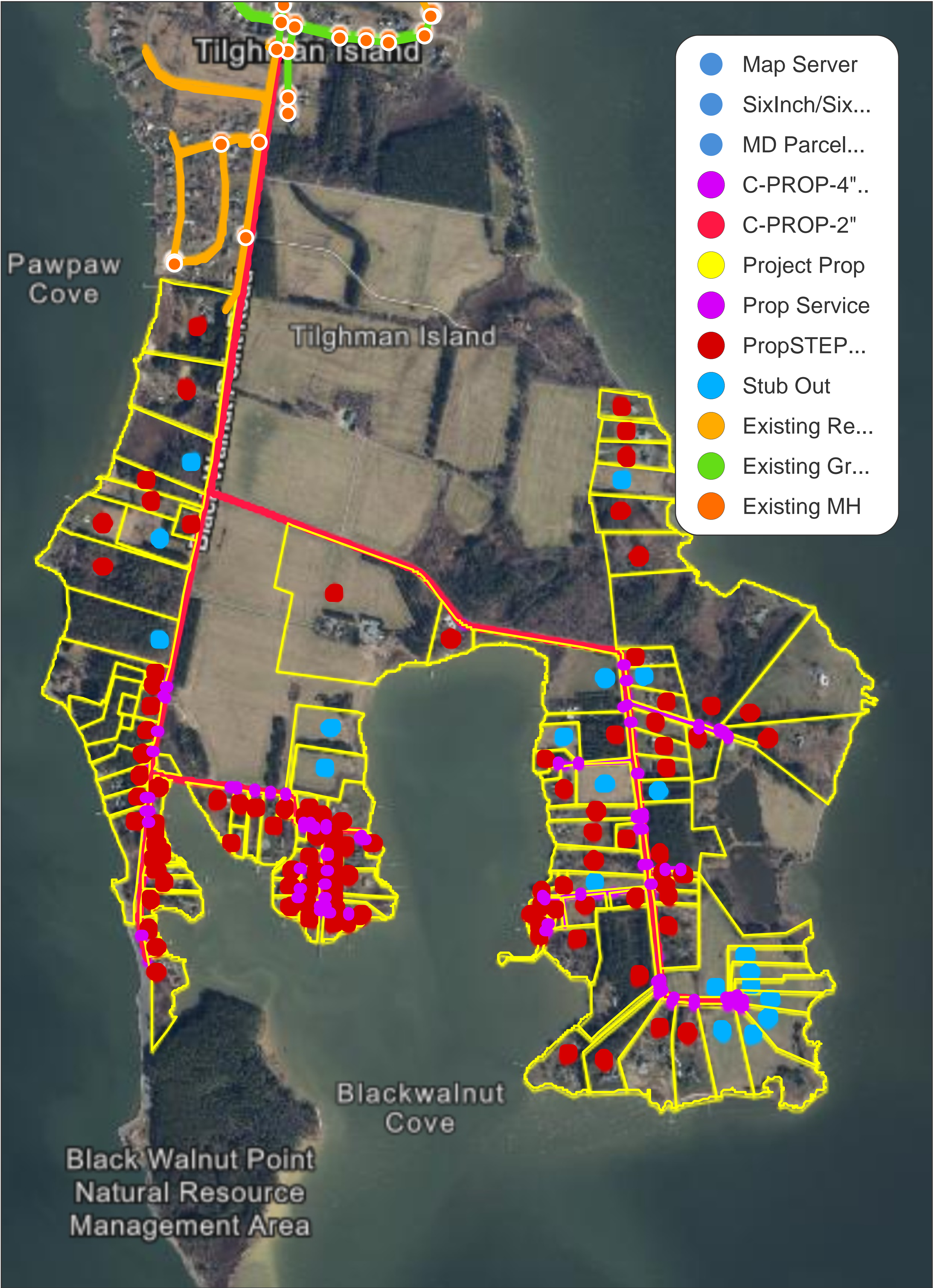
1. All four sewer alternatives require large heavy construction vehicles to work on private property to install, sewer pipe, abandon/remove existing septic tanks, install controls, and pump tanks.
2. The work required on private property is best performed in the late spring to late November period to avoid working on and with wet, plastic, or sticky soils. During the rest of the year, these soil characteristics can lead to substantial direct and collateral damage to landscaping. If service lateral and septic tank installation are attempted during the wet season or in wet weather, it is likely that timber mats will be required to minimize damage.
3. Plastic (PE) or fiberglass (FRP) tanks should be considered for septic tank replacements. These tanks can be carried by 2 or 4 men and set using the backhoe that excavated the hole.
4. Plastic (PE) or fiberglass (FRP) tanks require tie-downs and anchoring due to high groundwater conditions in the region.
5. All sewer alternatives require excavation for pipe installation, excavation for the abandonment of the existing septic tank, and site restoration.
6. Servicing STEP pump installations is less urgent than grinder pumps in that the head space in septic tanks can store at least a day's wastewater flow from the typical residence.
7. Talbot County has several STE and STEP systems in the same area of the county at Royal Oak, Belview, and Newcomb. Incorporation of Fairbanks Bar Neck into the workload of the existing area staff should minimize training and work flow disruption.

Alternatives Considered - Map

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	STE & STEP System (Alternative 5)		

Map of Existing and Proposed Areas

Below is a map of the existing Region V sewer service area serving Tilghman Island and the proposed extentsion to Fairbank and Bar Neck.



Smart Site Plan™	Alternative 5 - S...	<div>N</div> <div>↑</div>	SCALE	1" = 346 ft
			DATE	Mar 13, 2026

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	STE & STEP System (Alternative 5)		

Elevation

The entire project area is no more than 7ft. above mean sea level with many areas that are four, five, and six feet. The low flat elevation makes the project area vulnerable to the effects of sea level rise and storm surge. In the near term (through 2050) the major effects are likely to be due to storm surge. In the long run climate induced sea level rise will exacerbate storm surge. Storms such as hurricane Isabel in 2013 will flood the entire project area. The flooding that accompanies storm surge and sea level rise will affect existing septic systems by promoting the release of septic tank effluent to the surface along with bacteria, nitrogen, and phosphorous. Any release of sewage to the surface endangers human health.

Topography

The flat topography of the project area creates a septic system design, repair and construction challenge. The flat land surface, soils with slow percolation, and poor storm drainage prevent the construction of septic systems that comply with COMAR standards. Repairs require design accommodations that may or more likely will not correct septic system failure. Considering the high cost of septic system repair, homeowners must expend tens of thousands of dollars without a guarantee. The only corrective action for a septic system that is in disrepair or failed is to convert the septic tank to a holding tank and have the contents pumped weekly at a cost around \$500. The approximately \$26,000 annual cost is greater than most property owners can afford.

Soils

Most of the project area soils are Keyport silt loam. The soil is almost rock hard in the dry summer season and sticky and plastic when wet. In the early spring the soil is saturated at 20 inches depth. The need to support an excavation, such as for the septic tank, very much depends on ground conditions. Slow seeps of water into excavations will necessitate the removal of accumulated water. The water will be muddy making adherence to erosion and sedimentation requirements difficult. During the wet season soil plasticity may limit the use of backhoe, dump trucks, and septic tank delivery/placement truck.

Storm Drainage

There is no formal storm drainage in the project area. What drainage there is, is limited to roadside ditches which become choked with grass and brush growth. These ditches are cleaned periodically by the County. The flat topography and ditch vegetation create numerous areas of low-level

flooding. The poorly drained flooded areas extend the “wet season” which is generally the period between late January and mid-April. It is common in residential areas for homeowners to attach storm and roof drains to the sewer to address surface drainage problems thereby aggravating soil and surface drainage problems.



Drainage Ditch



Ditch Clearing

Wetland Impacts

Environmental impacts will be minimal. STEP-STE small diameter force mains can be installed without the need for deep trenching as required for conventional gravity systems. All disturbance from force mains will be temporary and mitigated upon completion. Sediment and erosion control is recommended during the temporary disturbances. While there are wetlands in the vicinity of this project, no disturbance temporary or permanent is proposed within any mapped wetlands. There are no mapped endangered species habitats located within the project area and no sites of archeological significance are known to exist within the area. The only increase in impervious area will occur at the proposed pump station site. Stormwater management for any pump station would be handled through rooftop and non-rooftop disconnects and other appropriate BMPs as needed.

Pawpaw
Cove

Dogwood
Harbor

Tilghman Island

Blackwalnut
Cove

- Estuarine
- Palustrine
- Riverine
- Estuarine
- Lacustrine
- Marine
- Palustrine
- Riverine
- Estuarine
- Lacustrine
- Marine
- Palustrine
- Riverine
- Wetlands - Polygon - Speci...
- Wetlands - Linear - Special...
- SixInch/SixInchImagery
- C-PROP-2FM
- C-PROP-4FM
- Project Properties
- Proposed Residential Con...
- PropSTEP/STP Tank/System
- Stub Out

Smart Site Plan™

ALTERNATIVE 5 - WETLANDS



SCALE 1" = 422 ft
└───┘

DATE Mar 13, 2026

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	STE & STEP System (Alternative 5)		

Pump Station

The proposed grinder pump system does not require a centralized pump station. The Orenco Prelos system, used as the basis for this analysis, provides adequate discharge head to overcome friction losses along the entire force main alignment. The force main discharges directly to the southernmost gravity manhole within the existing Region V collection system, where flow transitions to the existing gravity sewer network.

Easements

Maintenance easements must be secured at each individual lot connection for tank and line maintenance from the tank to the collection system. The County would be responsible for maintenance of the STEP system including the STEP pump, tank, and periodic tank pump-out.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	STE & STEP System (Alternative 5)		

Tanks

Water Tightness

Of all the alternatives considered, STEP systems present the most difficult installation challenges because of the size of the tanks and the need to achieve absolute water tightness. The water tightness requirement is difficult to achieve using existing septic tanks. Existing tanks and access manways are not likely to have been installed with attention focused on water tightness. Hence, all existing tanks are removed from service, pumped to remove the contents and disposed of according to Health Department agreement. A vacuum test should be used to confirm water tightness if the replacement tank is concrete. Further complication for STEP systems is related to the size and weight of replacement concrete septic tanks. Because of soil plasticity during several months of the year, access for heavy excavators, dump trucks, and concrete septic tank delivery vehicles can be difficult. Polyethylene and fiberglass are alternative septic tank materials. These tanks are lighter than concrete and less troublesome to install during the wet season. With the appropriate accessories, the water tightness of the installation can be achieved without vacuum testing. Vacuum testing should not be performed on plastic or fiberglass tanks. The major disadvantages of plastic or fiberglass tanks are the costly installation requirements and backfill materials.

Groundwater

Groundwater is high in the Fairbanks and Bar Neck region. This is part of the reason the existing septic systems are failing or underperforming. A construction challenge with fiberglass and plastic installation in high groundwater areas is the buoyancy issue. All plastic or fiberglass tanks must be anchored with tie-downs to prevent STEP tank floating. Many fiberglass and plastic tank manufacturers incorporate anti-floatation designs in their tanks. Specific measures for anti-floatation will be determined upon selection of a tank design and manufacturer.

Pumping Distance

The total combined force main length from the villages of Fairbank and Bar Neck to the existing Region V gravity manhole tie-in location is around 18,500 LF. This will require either a pump station, which presents its own set of construction problems, or STEP pumps capable of conveying the effluent the entire length of the force main unassisted by a pump station. It is possible to avoid the need for pump stations by selecting STEP pumps capable of pumping to the Tilghman sewer connection. The determining factor will be the cost of capable pumps versus the cost of pump stations.

Residential Lot Site Restoration

Each sewer extension connection and STEP tank installed on a residential lot will require lot restoration to pre-installation condition including any required fill, leveling, and grass seeding. This fill, leveling, and seeding will suffice for most lot disturbance. However, a uniform approach for each homeowner will inevitably cause some homeowners to be unhappy with lot restoration and landscaping conducted by the County and their contractors. With this understanding, it is recommended that each site be documented with photographs prior to any disturbance. Once the installation and standard remediation is completed, the homeowner may contact the County if they are unsatisfied with the restoration. The County will determine whether a discrepancy exists between the original and remediated lot conditions. Any costs above the budgeted costs will be allocated from the project contingency budget.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	STE & STEP System (Alternative 5)		

Energy Efficiency

STEP systems are more energy efficient than other typical pressure systems like grinder pump systems and vacuum systems. The energy savings reduce electrical loads and maximizes efficiency. Per the EPA Wastewater Technology Fact Sheet, STEP units generally cost less than \$1.00/month in energy usage.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	STE & STEP System (Alternative 5)		

Green Infrastructure

The proposed pump station will result in an increase in impervious area. Final design will determine the net result and total footprint. The estimated increase in impervious area will be roughly 500 ft². The required stormwater management will be implemented through a combination of rooftop and non-rooftop disconnects or, should ESDv require it, a BMP designed to adequately treat stormwater for the site. Final design will determine the most efficient and practical method of green infrastructure to implement on the site.

System Component Type:	Collection	System Component Name:	Force Main and Septic Retirement
Alternative Name:	STE & STEP System (Alternative 5)		

Community Planning

A sewer solution to the Fairbanks Bar Neck communities will increase the incentive for land development by removing the current disincentives associated with wastewater management. Presently, development is focused on the nearby Tilghman Island community because it is served by municipal sewer. A sewer solution for Fairbanks and Bar Neck would connect these communities to the Tilghman Island sewer system. The Fairbanks Bar Neck area currently provides some of the most affordable residential real estate in this area of Talbot County. Sewer associated development would allow much higher residential density than would be allowed under current land use regulations. The value of the tradeoff where reduced health and environmental risk is achieved in return for higher density development is difficult to quantify.

The development incentive associated with the construction of sewer service to the project area will in the near future (through 2050) likely lead to the development of much of the farmland between the Tilghman Island community and the Fairbanks Bar Neck areas. The area's natural beauty, the population exodus from the nearby large cities (Washington, Baltimore, and Philadelphia), and the increasing value of undeveloped land will drive the effort to develop Fairbanks, Bar Neck, Tilghman, and the area between Tilghman and Fairbanks Bar Neck. The Fairbanks Bar Neck neighborhoods will be gentrified and redeveloped with the loss of affordable housing.

Wells

All properties in the project area are served by on site well water supplies. Although an on the ground survey of the proximity of wells and septic systems in the project area was not performed, from a drive by perspective it is difficult to envision an arrangement of wells and septic systems that provide sufficient separation.

STEP System Longevity

STEP systems can last 20 years or longer with no major component repair or replacement. This allows a STEP system to sustainably serve a community with a high degree of reliability. Below are estimated lifespans for STEP system components.

- Septic Tank - 50 years
- Effluent Pump - 20 years
- Control Floats (2) - 10 years
- Effluent Filter - 20 years
- Collection Mains - 50 years
- Tank Pump-Outs - Every 10 years, on average

Sea Level Rise

Per NOAA 2022 Sea Level Rise Technical Report, project sea level rise is expected to be 10-12 inches over the next 30-years. This will exacerbate existing water table challenges impacting septic systems along Maryland's waterways. Failing and underperforming septic systems have reduced ability to treat nutrient loads prior to nutrients entering watersheds. Providing centralized treatment eliminates the possibility of failing septic leaching into groundwater and into Maryland's waterways.

Collection

System Component Name:

Force Main and
Septic
Retirement

Alternative Name: STE & STEP System (Alternative 5)

Alternative 5

STE and STEP System

Updated Annual O&M

Expense Item	Description	Annual Amount
Contract Waste Treatment	Wastewater treatment charges	100,000
Insurance	Insurance	3,000
Supplies	Parts, controls, floats, and maintenance materials	25,000
Repairs/Maintenance	STEP pump maintenance, inspections, and field service	70,000
Other	Miscellaneous operating expenses	7,000
Utilities	County side electrical costs	5,000
Contract Services, Other	Septic tanks pump out and solids removal	15,000
Salaries/Benefits	Operations staff time, inspections, and service response	110,000
Administrative/Office	Billing, records, and management	12,000
Residential Electric Cost	Homeowner electrical use for 104 STEP units	18,000

Total Annual O&M: 365,000

Annual O&M

Annual O&M costs are calculated through a combination of increasing the existing Tilghman District O&M costs by a proportional percentage of growth from the additional 105 lots. This is also combined with costs specific to this alternative. The total O&M costs are representative of the sewer extension only and do not reflect any existing costs. The total number shown should be considered as additional costs to the Tilghman District associated with the sewer extension project. An additional consideration not spelled out in the O&M costs as they do not impact the County budget, are the homeowner costs associated with electrical charges to run the pumps are \$15 per pump/homeowner. The total cost to the homeowners for electrical use across the full buildout of the system is \$1,560/year.

Alternatives Considered - Project Costs

**System Component
Type:**

Collection

**System Component
Name:**

Force Main and
Septic Retirement

Alternative Name:

STE & STEP System (Alternative 5)

Construction Costs

Item	Description	Cost
Development (Construction)	Septic tank/Pump/Controls	\$1,560,000.00
Development (Construction)	Driveway Trench Repair	\$100,000.00
Development (Construction)	2" Force Main 9,500 LF	\$360,000.00
Development (Construction)	4" Force Main 12,210 LF	\$670,000.00
Development (Construction)	Restoration	\$15,000.00
Development (Construction)	Traffic Control	\$35,000.00
Development (Construction)	Service Line	\$55,000.00
Development (Construction)	Abandonment of Ex Tank	\$660,000.00
Development (Construction)	Mobilization	\$396,000.00
Development (Construction)	Sediment Control	\$75,000.00
Development (Construction)	County Road Pavement Restoration	\$220,000.00

Alternatives Considered - Project Costs

Development (Construction)	Site Remediation	\$210,000.00
	Total Construction	\$4,356,000.00

Non Construction Costs		
Item	Description	Cost
Legal Services	Administration and Legal	\$175,000.40
Contingencies	Contingency	\$870,000.00
Architectural, Engineering & Planning	Engineering Planning & Design	\$390,000.00
Engineering - Construction Administration	Construction Phase Services (CM, CI, & Construction Design Services)	\$540,000.00
	Total Non Construction	\$1,975,000.00

Project Costs

The budget reflects rough costing for the full septic elimination of Fairbank and Bar Neck. The soft costs associated with engineering, design, planning, construction services, legal, and administrative services are based on MDE guidelines (Soft Cost Guidelines). The contingency is at 20% of construction costs due to the numerous potential construction problems identified in this alternative which could present a change order or cost adjustment during the construction phase.

See the estimated loan amortization schedule in the exhibit below.

Fairbanks Barneck Loan Amortization Schedule

Loan Information		Cost
Loan amount	\$ 6,331,000.00	\$6,331,000.00
Annual interest rate	2.125%	Grant
Loan period in years	30	\$0.00
Start date of loan	3/13/2026	
Monthly payment	\$ 23,798.33	
Number of payments	360	
Total interest	\$ 2,236,399.10	
Total cost of loan	\$ 8,567,399.10	

No.	Payment Date	Beginning Balance	Payment	Principal	Interest	Ending Balance
1	4/13/2026	\$ 6,331,000.00	\$ 23,798.33	\$ 12,587.18	\$ 11,211.15	\$ 6,318,412.82
2	5/13/2026	\$ 6,318,412.82	\$ 23,798.33	\$ 12,609.47	\$ 11,188.86	\$ 6,305,803.34
3	6/13/2026	\$ 6,305,803.34	\$ 23,798.33	\$ 12,631.80	\$ 11,166.53	\$ 6,293,171.54
4	7/13/2026	\$ 6,293,171.54	\$ 23,798.33	\$ 12,654.17	\$ 11,144.16	\$ 6,280,517.36
5	8/13/2026	\$ 6,280,517.36	\$ 23,798.33	\$ 12,676.58	\$ 11,121.75	\$ 6,267,840.78
6	9/13/2026	\$ 6,267,840.78	\$ 23,798.33	\$ 12,699.03	\$ 11,099.30	\$ 6,255,141.75
7	10/13/2026	\$ 6,255,141.75	\$ 23,798.33	\$ 12,721.52	\$ 11,076.81	\$ 6,242,420.24
8	11/13/2026	\$ 6,242,420.24	\$ 23,798.33	\$ 12,744.04	\$ 11,054.29	\$ 6,229,676.19
9	12/13/2026	\$ 6,229,676.19	\$ 23,798.33	\$ 12,766.61	\$ 11,031.72	\$ 6,216,909.58
10	1/13/2027	\$ 6,216,909.58	\$ 23,798.33	\$ 12,789.22	\$ 11,009.11	\$ 6,204,120.36
11	2/13/2027	\$ 6,204,120.36	\$ 23,798.33	\$ 12,811.87	\$ 10,986.46	\$ 6,191,308.49
12	3/13/2027	\$ 6,191,308.49	\$ 23,798.33	\$ 12,834.56	\$ 10,963.78	\$ 6,178,473.93
13	4/13/2027	\$ 6,178,473.93	\$ 23,798.33	\$ 12,857.28	\$ 10,941.05	\$ 6,165,616.65
14	5/13/2027	\$ 6,165,616.65	\$ 23,798.33	\$ 12,880.05	\$ 10,918.28	\$ 6,152,736.60
15	6/13/2027	\$ 6,152,736.60	\$ 23,798.33	\$ 12,902.86	\$ 10,895.47	\$ 6,139,833.74
16	7/13/2027	\$ 6,139,833.74	\$ 23,798.33	\$ 12,925.71	\$ 10,872.62	\$ 6,126,908.03
17	8/13/2027	\$ 6,126,908.03	\$ 23,798.33	\$ 12,948.60	\$ 10,849.73	\$ 6,113,959.43
18	9/13/2027	\$ 6,113,959.43	\$ 23,798.33	\$ 12,971.53	\$ 10,826.80	\$ 6,100,987.91
19	10/13/2027	\$ 6,100,987.91	\$ 23,798.33	\$ 12,994.50	\$ 10,803.83	\$ 6,087,993.41
20	11/13/2027	\$ 6,087,993.41	\$ 23,798.33	\$ 13,017.51	\$ 10,780.82	\$ 6,074,975.90
21	12/13/2027	\$ 6,074,975.90	\$ 23,798.33	\$ 13,040.56	\$ 10,757.77	\$ 6,061,935.34
22	1/13/2028	\$ 6,061,935.34	\$ 23,798.33	\$ 13,063.65	\$ 10,734.68	\$ 6,048,871.68
23	2/13/2028	\$ 6,048,871.68	\$ 23,798.33	\$ 13,086.79	\$ 10,711.54	\$ 6,035,784.90
24	3/13/2028	\$ 6,035,784.90	\$ 23,798.33	\$ 13,109.96	\$ 10,688.37	\$ 6,022,674.93
25	4/13/2028	\$ 6,022,674.93	\$ 23,798.33	\$ 13,133.18	\$ 10,665.15	\$ 6,009,541.76
26	5/13/2028	\$ 6,009,541.76	\$ 23,798.33	\$ 13,156.43	\$ 10,641.90	\$ 5,996,385.32
27	6/13/2028	\$ 5,996,385.32	\$ 23,798.33	\$ 13,179.73	\$ 10,618.60	\$ 5,983,205.59
28	7/13/2028	\$ 5,983,205.59	\$ 23,798.33	\$ 13,203.07	\$ 10,595.26	\$ 5,970,002.52
29	8/13/2028	\$ 5,970,002.52	\$ 23,798.33	\$ 13,226.45	\$ 10,571.88	\$ 5,956,776.07
30	9/13/2028	\$ 5,956,776.07	\$ 23,798.33	\$ 13,249.87	\$ 10,548.46	\$ 5,943,526.20
31	10/13/2028	\$ 5,943,526.20	\$ 23,798.33	\$ 13,273.34	\$ 10,524.99	\$ 5,930,252.86
32	11/13/2028	\$ 5,930,252.86	\$ 23,798.33	\$ 13,296.84	\$ 10,501.49	\$ 5,916,956.02
33	12/13/2028	\$ 5,916,956.02	\$ 23,798.33	\$ 13,320.39	\$ 10,477.94	\$ 5,903,635.63
34	1/13/2029	\$ 5,903,635.63	\$ 23,798.33	\$ 13,343.98	\$ 10,454.35	\$ 5,890,291.65

No.	Payment Date	Beginning Balance	Payment	Principal	Interest	Ending Balance
35	2/13/2029	\$ 5,890,291.65	\$ 23,798.33	\$ 13,367.61	\$ 10,430.72	\$ 5,876,924.05
36	3/13/2029	\$ 5,876,924.05	\$ 23,798.33	\$ 13,391.28	\$ 10,407.05	\$ 5,863,532.77
37	4/13/2029	\$ 5,863,532.77	\$ 23,798.33	\$ 13,414.99	\$ 10,383.34	\$ 5,850,117.78
38	5/13/2029	\$ 5,850,117.78	\$ 23,798.33	\$ 13,438.75	\$ 10,359.58	\$ 5,836,679.03
39	6/13/2029	\$ 5,836,679.03	\$ 23,798.33	\$ 13,462.55	\$ 10,335.79	\$ 5,823,216.49
40	7/13/2029	\$ 5,823,216.49	\$ 23,798.33	\$ 13,486.38	\$ 10,311.95	\$ 5,809,730.10
41	8/13/2029	\$ 5,809,730.10	\$ 23,798.33	\$ 13,510.27	\$ 10,288.06	\$ 5,796,219.83
42	9/13/2029	\$ 5,796,219.83	\$ 23,798.33	\$ 13,534.19	\$ 10,264.14	\$ 5,782,685.64
43	10/13/2029	\$ 5,782,685.64	\$ 23,798.33	\$ 13,558.16	\$ 10,240.17	\$ 5,769,127.48
44	11/13/2029	\$ 5,769,127.48	\$ 23,798.33	\$ 13,582.17	\$ 10,216.16	\$ 5,755,545.32
45	12/13/2029	\$ 5,755,545.32	\$ 23,798.33	\$ 13,606.22	\$ 10,192.11	\$ 5,741,939.10
46	1/13/2030	\$ 5,741,939.10	\$ 23,798.33	\$ 13,630.31	\$ 10,168.02	\$ 5,728,308.78
47	2/13/2030	\$ 5,728,308.78	\$ 23,798.33	\$ 13,654.45	\$ 10,143.88	\$ 5,714,654.33
48	3/13/2030	\$ 5,714,654.33	\$ 23,798.33	\$ 13,678.63	\$ 10,119.70	\$ 5,700,975.70
49	4/13/2030	\$ 5,700,975.70	\$ 23,798.33	\$ 13,702.85	\$ 10,095.48	\$ 5,687,272.85
50	5/13/2030	\$ 5,687,272.85	\$ 23,798.33	\$ 13,727.12	\$ 10,071.21	\$ 5,673,545.73
51	6/13/2030	\$ 5,673,545.73	\$ 23,798.33	\$ 13,751.43	\$ 10,046.90	\$ 5,659,794.30
52	7/13/2030	\$ 5,659,794.30	\$ 23,798.33	\$ 13,775.78	\$ 10,022.55	\$ 5,646,018.53
53	8/13/2030	\$ 5,646,018.53	\$ 23,798.33	\$ 13,800.17	\$ 9,998.16	\$ 5,632,218.35
54	9/13/2030	\$ 5,632,218.35	\$ 23,798.33	\$ 13,824.61	\$ 9,973.72	\$ 5,618,393.74
55	10/13/2030	\$ 5,618,393.74	\$ 23,798.33	\$ 13,849.09	\$ 9,949.24	\$ 5,604,544.65
56	11/13/2030	\$ 5,604,544.65	\$ 23,798.33	\$ 13,873.62	\$ 9,924.71	\$ 5,590,671.03
57	12/13/2030	\$ 5,590,671.03	\$ 23,798.33	\$ 13,898.18	\$ 9,900.15	\$ 5,576,772.85
58	1/13/2031	\$ 5,576,772.85	\$ 23,798.33	\$ 13,922.80	\$ 9,875.54	\$ 5,562,850.05
59	2/13/2031	\$ 5,562,850.05	\$ 23,798.33	\$ 13,947.45	\$ 9,850.88	\$ 5,548,902.60
60	3/13/2031	\$ 5,548,902.60	\$ 23,798.33	\$ 13,972.15	\$ 9,826.18	\$ 5,534,930.45
61	4/13/2031	\$ 5,534,930.45	\$ 23,798.33	\$ 13,996.89	\$ 9,801.44	\$ 5,520,933.56
62	5/13/2031	\$ 5,520,933.56	\$ 23,798.33	\$ 14,021.68	\$ 9,776.65	\$ 5,506,911.89
63	6/13/2031	\$ 5,506,911.89	\$ 23,798.33	\$ 14,046.51	\$ 9,751.82	\$ 5,492,865.38
64	7/13/2031	\$ 5,492,865.38	\$ 23,798.33	\$ 14,071.38	\$ 9,726.95	\$ 5,478,794.00
65	8/13/2031	\$ 5,478,794.00	\$ 23,798.33	\$ 14,096.30	\$ 9,702.03	\$ 5,464,697.70
66	9/13/2031	\$ 5,464,697.70	\$ 23,798.33	\$ 14,121.26	\$ 9,677.07	\$ 5,450,576.43
67	10/13/2031	\$ 5,450,576.43	\$ 23,798.33	\$ 14,146.27	\$ 9,652.06	\$ 5,436,430.17
68	11/13/2031	\$ 5,436,430.17	\$ 23,798.33	\$ 14,171.32	\$ 9,627.01	\$ 5,422,258.85
69	12/13/2031	\$ 5,422,258.85	\$ 23,798.33	\$ 14,196.41	\$ 9,601.92	\$ 5,408,062.43
70	1/13/2032	\$ 5,408,062.43	\$ 23,798.33	\$ 14,221.55	\$ 9,576.78	\$ 5,393,840.88
71	2/13/2032	\$ 5,393,840.88	\$ 23,798.33	\$ 14,246.74	\$ 9,551.59	\$ 5,379,594.14
72	3/13/2032	\$ 5,379,594.14	\$ 23,798.33	\$ 14,271.97	\$ 9,526.36	\$ 5,365,322.18
73	4/13/2032	\$ 5,365,322.18	\$ 23,798.33	\$ 14,297.24	\$ 9,501.09	\$ 5,351,024.94
74	5/13/2032	\$ 5,351,024.94	\$ 23,798.33	\$ 14,322.56	\$ 9,475.77	\$ 5,336,702.38
75	6/13/2032	\$ 5,336,702.38	\$ 23,798.33	\$ 14,347.92	\$ 9,450.41	\$ 5,322,354.46
76	7/13/2032	\$ 5,322,354.46	\$ 23,798.33	\$ 14,373.33	\$ 9,425.00	\$ 5,307,981.13
77	8/13/2032	\$ 5,307,981.13	\$ 23,798.33	\$ 14,398.78	\$ 9,399.55	\$ 5,293,582.35
78	9/13/2032	\$ 5,293,582.35	\$ 23,798.33	\$ 14,424.28	\$ 9,374.05	\$ 5,279,158.07
79	10/13/2032	\$ 5,279,158.07	\$ 23,798.33	\$ 14,449.82	\$ 9,348.51	\$ 5,264,708.25

No.	Payment Date	Beginning Balance	Payment	Principal	Interest	Ending Balance
80	11/13/2032	\$ 5,264,708.25	\$ 23,798.33	\$ 14,475.41	\$ 9,322.92	\$ 5,250,232.84
81	12/13/2032	\$ 5,250,232.84	\$ 23,798.33	\$ 14,501.04	\$ 9,297.29	\$ 5,235,731.79
82	1/13/2033	\$ 5,235,731.79	\$ 23,798.33	\$ 14,526.72	\$ 9,271.61	\$ 5,221,205.07
83	2/13/2033	\$ 5,221,205.07	\$ 23,798.33	\$ 14,552.45	\$ 9,245.88	\$ 5,206,652.63
84	3/13/2033	\$ 5,206,652.63	\$ 23,798.33	\$ 14,578.22	\$ 9,220.11	\$ 5,192,074.41
85	4/13/2033	\$ 5,192,074.41	\$ 23,798.33	\$ 14,604.03	\$ 9,194.30	\$ 5,177,470.38
86	5/13/2033	\$ 5,177,470.38	\$ 23,798.33	\$ 14,629.89	\$ 9,168.44	\$ 5,162,840.48
87	6/13/2033	\$ 5,162,840.48	\$ 23,798.33	\$ 14,655.80	\$ 9,142.53	\$ 5,148,184.68
88	7/13/2033	\$ 5,148,184.68	\$ 23,798.33	\$ 14,681.75	\$ 9,116.58	\$ 5,133,502.93
89	8/13/2033	\$ 5,133,502.93	\$ 23,798.33	\$ 14,707.75	\$ 9,090.58	\$ 5,118,795.18
90	9/13/2033	\$ 5,118,795.18	\$ 23,798.33	\$ 14,733.80	\$ 9,064.53	\$ 5,104,061.38
91	10/13/2033	\$ 5,104,061.38	\$ 23,798.33	\$ 14,759.89	\$ 9,038.44	\$ 5,089,301.49
92	11/13/2033	\$ 5,089,301.49	\$ 23,798.33	\$ 14,786.03	\$ 9,012.30	\$ 5,074,515.46
93	12/13/2033	\$ 5,074,515.46	\$ 23,798.33	\$ 14,812.21	\$ 8,986.12	\$ 5,059,703.25
94	1/13/2034	\$ 5,059,703.25	\$ 23,798.33	\$ 14,838.44	\$ 8,959.89	\$ 5,044,864.81
95	2/13/2034	\$ 5,044,864.81	\$ 23,798.33	\$ 14,864.72	\$ 8,933.61	\$ 5,030,000.10
96	3/13/2034	\$ 5,030,000.10	\$ 23,798.33	\$ 14,891.04	\$ 8,907.29	\$ 5,015,109.06
97	4/13/2034	\$ 5,015,109.06	\$ 23,798.33	\$ 14,917.41	\$ 8,880.92	\$ 5,000,191.65
98	5/13/2034	\$ 5,000,191.65	\$ 23,798.33	\$ 14,943.82	\$ 8,854.51	\$ 4,985,247.83
99	6/13/2034	\$ 4,985,247.83	\$ 23,798.33	\$ 14,970.29	\$ 8,828.04	\$ 4,970,277.54
100	7/13/2034	\$ 4,970,277.54	\$ 23,798.33	\$ 14,996.80	\$ 8,801.53	\$ 4,955,280.74
101	8/13/2034	\$ 4,955,280.74	\$ 23,798.33	\$ 15,023.35	\$ 8,774.98	\$ 4,940,257.39
102	9/13/2034	\$ 4,940,257.39	\$ 23,798.33	\$ 15,049.96	\$ 8,748.37	\$ 4,925,207.43
103	10/13/2034	\$ 4,925,207.43	\$ 23,798.33	\$ 15,076.61	\$ 8,721.72	\$ 4,910,130.82
104	11/13/2034	\$ 4,910,130.82	\$ 23,798.33	\$ 15,103.31	\$ 8,695.02	\$ 4,895,027.51
105	12/13/2034	\$ 4,895,027.51	\$ 23,798.33	\$ 15,130.05	\$ 8,668.28	\$ 4,879,897.46
106	1/13/2035	\$ 4,879,897.46	\$ 23,798.33	\$ 15,156.85	\$ 8,641.49	\$ 4,864,740.61
107	2/13/2035	\$ 4,864,740.61	\$ 23,798.33	\$ 15,183.69	\$ 8,614.64	\$ 4,849,556.93
108	3/13/2035	\$ 4,849,556.93	\$ 23,798.33	\$ 15,210.57	\$ 8,587.76	\$ 4,834,346.35
109	4/13/2035	\$ 4,834,346.35	\$ 23,798.33	\$ 15,237.51	\$ 8,560.82	\$ 4,819,108.84
110	5/13/2035	\$ 4,819,108.84	\$ 23,798.33	\$ 15,264.49	\$ 8,533.84	\$ 4,803,844.35
111	6/13/2035	\$ 4,803,844.35	\$ 23,798.33	\$ 15,291.52	\$ 8,506.81	\$ 4,788,552.83
112	7/13/2035	\$ 4,788,552.83	\$ 23,798.33	\$ 15,318.60	\$ 8,479.73	\$ 4,773,234.22
113	8/13/2035	\$ 4,773,234.22	\$ 23,798.33	\$ 15,345.73	\$ 8,452.60	\$ 4,757,888.50
114	9/13/2035	\$ 4,757,888.50	\$ 23,798.33	\$ 15,372.90	\$ 8,425.43	\$ 4,742,515.59
115	10/13/2035	\$ 4,742,515.59	\$ 23,798.33	\$ 15,400.13	\$ 8,398.20	\$ 4,727,115.47
116	11/13/2035	\$ 4,727,115.47	\$ 23,798.33	\$ 15,427.40	\$ 8,370.93	\$ 4,711,688.07
117	12/13/2035	\$ 4,711,688.07	\$ 23,798.33	\$ 15,454.72	\$ 8,343.61	\$ 4,696,233.35
118	1/13/2036	\$ 4,696,233.35	\$ 23,798.33	\$ 15,482.08	\$ 8,316.25	\$ 4,680,751.27
119	2/13/2036	\$ 4,680,751.27	\$ 23,798.33	\$ 15,509.50	\$ 8,288.83	\$ 4,665,241.77
120	3/13/2036	\$ 4,665,241.77	\$ 23,798.33	\$ 15,536.97	\$ 8,261.37	\$ 4,649,704.80
121	4/13/2036	\$ 4,649,704.80	\$ 23,798.33	\$ 15,564.48	\$ 8,233.85	\$ 4,634,140.32
122	5/13/2036	\$ 4,634,140.32	\$ 23,798.33	\$ 15,592.04	\$ 8,206.29	\$ 4,618,548.28
123	6/13/2036	\$ 4,618,548.28	\$ 23,798.33	\$ 15,619.65	\$ 8,178.68	\$ 4,602,928.63
124	7/13/2036	\$ 4,602,928.63	\$ 23,798.33	\$ 15,647.31	\$ 8,151.02	\$ 4,587,281.32

No.	Payment Date	Beginning Balance	Payment	Principal	Interest	Ending Balance
125	8/13/2036	\$ 4,587,281.32	\$ 23,798.33	\$ 15,675.02	\$ 8,123.31	\$ 4,571,606.30
126	9/13/2036	\$ 4,571,606.30	\$ 23,798.33	\$ 15,702.78	\$ 8,095.55	\$ 4,555,903.52
127	10/13/2036	\$ 4,555,903.52	\$ 23,798.33	\$ 15,730.59	\$ 8,067.75	\$ 4,540,172.94
128	11/13/2036	\$ 4,540,172.94	\$ 23,798.33	\$ 15,758.44	\$ 8,039.89	\$ 4,524,414.50
129	12/13/2036	\$ 4,524,414.50	\$ 23,798.33	\$ 15,786.35	\$ 8,011.98	\$ 4,508,628.15
130	1/13/2037	\$ 4,508,628.15	\$ 23,798.33	\$ 15,814.30	\$ 7,984.03	\$ 4,492,813.85
131	2/13/2037	\$ 4,492,813.85	\$ 23,798.33	\$ 15,842.31	\$ 7,956.02	\$ 4,476,971.54
132	3/13/2037	\$ 4,476,971.54	\$ 23,798.33	\$ 15,870.36	\$ 7,927.97	\$ 4,461,101.18
133	4/13/2037	\$ 4,461,101.18	\$ 23,798.33	\$ 15,898.46	\$ 7,899.87	\$ 4,445,202.72
134	5/13/2037	\$ 4,445,202.72	\$ 23,798.33	\$ 15,926.62	\$ 7,871.71	\$ 4,429,276.10
135	6/13/2037	\$ 4,429,276.10	\$ 23,798.33	\$ 15,954.82	\$ 7,843.51	\$ 4,413,321.28
136	7/13/2037	\$ 4,413,321.28	\$ 23,798.33	\$ 15,983.07	\$ 7,815.26	\$ 4,397,338.20
137	8/13/2037	\$ 4,397,338.20	\$ 23,798.33	\$ 16,011.38	\$ 7,786.95	\$ 4,381,326.83
138	9/13/2037	\$ 4,381,326.83	\$ 23,798.33	\$ 16,039.73	\$ 7,758.60	\$ 4,365,287.10
139	10/13/2037	\$ 4,365,287.10	\$ 23,798.33	\$ 16,068.13	\$ 7,730.20	\$ 4,349,218.96
140	11/13/2037	\$ 4,349,218.96	\$ 23,798.33	\$ 16,096.59	\$ 7,701.74	\$ 4,333,122.37
141	12/13/2037	\$ 4,333,122.37	\$ 23,798.33	\$ 16,125.09	\$ 7,673.24	\$ 4,316,997.28
142	1/13/2038	\$ 4,316,997.28	\$ 23,798.33	\$ 16,153.65	\$ 7,644.68	\$ 4,300,843.63
143	2/13/2038	\$ 4,300,843.63	\$ 23,798.33	\$ 16,182.25	\$ 7,616.08	\$ 4,284,661.38
144	3/13/2038	\$ 4,284,661.38	\$ 23,798.33	\$ 16,210.91	\$ 7,587.42	\$ 4,268,450.47
145	4/13/2038	\$ 4,268,450.47	\$ 23,798.33	\$ 16,239.62	\$ 7,558.71	\$ 4,252,210.85
146	5/13/2038	\$ 4,252,210.85	\$ 23,798.33	\$ 16,268.37	\$ 7,529.96	\$ 4,235,942.48
147	6/13/2038	\$ 4,235,942.48	\$ 23,798.33	\$ 16,297.18	\$ 7,501.15	\$ 4,219,645.29
148	7/13/2038	\$ 4,219,645.29	\$ 23,798.33	\$ 16,326.04	\$ 7,472.29	\$ 4,203,319.25
149	8/13/2038	\$ 4,203,319.25	\$ 23,798.33	\$ 16,354.95	\$ 7,443.38	\$ 4,186,964.30
150	9/13/2038	\$ 4,186,964.30	\$ 23,798.33	\$ 16,383.91	\$ 7,414.42	\$ 4,170,580.38
151	10/13/2038	\$ 4,170,580.38	\$ 23,798.33	\$ 16,412.93	\$ 7,385.40	\$ 4,154,167.46
152	11/13/2038	\$ 4,154,167.46	\$ 23,798.33	\$ 16,441.99	\$ 7,356.34	\$ 4,137,725.46
153	12/13/2038	\$ 4,137,725.46	\$ 23,798.33	\$ 16,471.11	\$ 7,327.22	\$ 4,121,254.35
154	1/13/2039	\$ 4,121,254.35	\$ 23,798.33	\$ 16,500.28	\$ 7,298.05	\$ 4,104,754.08
155	2/13/2039	\$ 4,104,754.08	\$ 23,798.33	\$ 16,529.50	\$ 7,268.84	\$ 4,088,224.58
156	3/13/2039	\$ 4,088,224.58	\$ 23,798.33	\$ 16,558.77	\$ 7,239.56	\$ 4,071,665.82
157	4/13/2039	\$ 4,071,665.82	\$ 23,798.33	\$ 16,588.09	\$ 7,210.24	\$ 4,055,077.73
158	5/13/2039	\$ 4,055,077.73	\$ 23,798.33	\$ 16,617.46	\$ 7,180.87	\$ 4,038,460.26
159	6/13/2039	\$ 4,038,460.26	\$ 23,798.33	\$ 16,646.89	\$ 7,151.44	\$ 4,021,813.37
160	7/13/2039	\$ 4,021,813.37	\$ 23,798.33	\$ 16,676.37	\$ 7,121.96	\$ 4,005,137.00
161	8/13/2039	\$ 4,005,137.00	\$ 23,798.33	\$ 16,705.90	\$ 7,092.43	\$ 3,988,431.10
162	9/13/2039	\$ 3,988,431.10	\$ 23,798.33	\$ 16,735.48	\$ 7,062.85	\$ 3,971,695.62
163	10/13/2039	\$ 3,971,695.62	\$ 23,798.33	\$ 16,765.12	\$ 7,033.21	\$ 3,954,930.50
164	11/13/2039	\$ 3,954,930.50	\$ 23,798.33	\$ 16,794.81	\$ 7,003.52	\$ 3,938,135.69
165	12/13/2039	\$ 3,938,135.69	\$ 23,798.33	\$ 16,824.55	\$ 6,973.78	\$ 3,921,311.14
166	1/13/2040	\$ 3,921,311.14	\$ 23,798.33	\$ 16,854.34	\$ 6,943.99	\$ 3,904,456.80
167	2/13/2040	\$ 3,904,456.80	\$ 23,798.33	\$ 16,884.19	\$ 6,914.14	\$ 3,887,572.61
168	3/13/2040	\$ 3,887,572.61	\$ 23,798.33	\$ 16,914.09	\$ 6,884.24	\$ 3,870,658.52
169	4/13/2040	\$ 3,870,658.52	\$ 23,798.33	\$ 16,944.04	\$ 6,854.29	\$ 3,853,714.48

No.	Payment Date	Beginning Balance	Payment	Principal	Interest	Ending Balance
170	5/13/2040	\$ 3,853,714.48	\$ 23,798.33	\$ 16,974.04	\$ 6,824.29	\$ 3,836,740.44
171	6/13/2040	\$ 3,836,740.44	\$ 23,798.33	\$ 17,004.10	\$ 6,794.23	\$ 3,819,736.33
172	7/13/2040	\$ 3,819,736.33	\$ 23,798.33	\$ 17,034.21	\$ 6,764.12	\$ 3,802,702.12
173	8/13/2040	\$ 3,802,702.12	\$ 23,798.33	\$ 17,064.38	\$ 6,733.95	\$ 3,785,637.74
174	9/13/2040	\$ 3,785,637.74	\$ 23,798.33	\$ 17,094.60	\$ 6,703.73	\$ 3,768,543.14
175	10/13/2040	\$ 3,768,543.14	\$ 23,798.33	\$ 17,124.87	\$ 6,673.46	\$ 3,751,418.27
176	11/13/2040	\$ 3,751,418.27	\$ 23,798.33	\$ 17,155.19	\$ 6,643.14	\$ 3,734,263.08
177	12/13/2040	\$ 3,734,263.08	\$ 23,798.33	\$ 17,185.57	\$ 6,612.76	\$ 3,717,077.51
178	1/13/2041	\$ 3,717,077.51	\$ 23,798.33	\$ 17,216.01	\$ 6,582.32	\$ 3,699,861.50
179	2/13/2041	\$ 3,699,861.50	\$ 23,798.33	\$ 17,246.49	\$ 6,551.84	\$ 3,682,615.01
180	3/13/2041	\$ 3,682,615.01	\$ 23,798.33	\$ 17,277.03	\$ 6,521.30	\$ 3,665,337.97
181	4/13/2041	\$ 3,665,337.97	\$ 23,798.33	\$ 17,307.63	\$ 6,490.70	\$ 3,648,030.35
182	5/13/2041	\$ 3,648,030.35	\$ 23,798.33	\$ 17,338.28	\$ 6,460.05	\$ 3,630,692.07
183	6/13/2041	\$ 3,630,692.07	\$ 23,798.33	\$ 17,368.98	\$ 6,429.35	\$ 3,613,323.09
184	7/13/2041	\$ 3,613,323.09	\$ 23,798.33	\$ 17,399.74	\$ 6,398.59	\$ 3,595,923.35
185	8/13/2041	\$ 3,595,923.35	\$ 23,798.33	\$ 17,430.55	\$ 6,367.78	\$ 3,578,492.80
186	9/13/2041	\$ 3,578,492.80	\$ 23,798.33	\$ 17,461.42	\$ 6,336.91	\$ 3,561,031.38
187	10/13/2041	\$ 3,561,031.38	\$ 23,798.33	\$ 17,492.34	\$ 6,305.99	\$ 3,543,539.05
188	11/13/2041	\$ 3,543,539.05	\$ 23,798.33	\$ 17,523.31	\$ 6,275.02	\$ 3,526,015.73
189	12/13/2041	\$ 3,526,015.73	\$ 23,798.33	\$ 17,554.34	\$ 6,243.99	\$ 3,508,461.39
190	1/13/2042	\$ 3,508,461.39	\$ 23,798.33	\$ 17,585.43	\$ 6,212.90	\$ 3,490,875.96
191	2/13/2042	\$ 3,490,875.96	\$ 23,798.33	\$ 17,616.57	\$ 6,181.76	\$ 3,473,259.39
192	3/13/2042	\$ 3,473,259.39	\$ 23,798.33	\$ 17,647.77	\$ 6,150.56	\$ 3,455,611.62
193	4/13/2042	\$ 3,455,611.62	\$ 23,798.33	\$ 17,679.02	\$ 6,119.31	\$ 3,437,932.60
194	5/13/2042	\$ 3,437,932.60	\$ 23,798.33	\$ 17,710.33	\$ 6,088.01	\$ 3,420,222.28
195	6/13/2042	\$ 3,420,222.28	\$ 23,798.33	\$ 17,741.69	\$ 6,056.64	\$ 3,402,480.59
196	7/13/2042	\$ 3,402,480.59	\$ 23,798.33	\$ 17,773.10	\$ 6,025.23	\$ 3,384,707.48
197	8/13/2042	\$ 3,384,707.48	\$ 23,798.33	\$ 17,804.58	\$ 5,993.75	\$ 3,366,902.91
198	9/13/2042	\$ 3,366,902.91	\$ 23,798.33	\$ 17,836.11	\$ 5,962.22	\$ 3,349,066.80
199	10/13/2042	\$ 3,349,066.80	\$ 23,798.33	\$ 17,867.69	\$ 5,930.64	\$ 3,331,199.11
200	11/13/2042	\$ 3,331,199.11	\$ 23,798.33	\$ 17,899.33	\$ 5,899.00	\$ 3,313,299.77
201	12/13/2042	\$ 3,313,299.77	\$ 23,798.33	\$ 17,931.03	\$ 5,867.30	\$ 3,295,368.75
202	1/13/2043	\$ 3,295,368.75	\$ 23,798.33	\$ 17,962.78	\$ 5,835.55	\$ 3,277,405.96
203	2/13/2043	\$ 3,277,405.96	\$ 23,798.33	\$ 17,994.59	\$ 5,803.74	\$ 3,259,411.37
204	3/13/2043	\$ 3,259,411.37	\$ 23,798.33	\$ 18,026.46	\$ 5,771.87	\$ 3,241,384.92
205	4/13/2043	\$ 3,241,384.92	\$ 23,798.33	\$ 18,058.38	\$ 5,739.95	\$ 3,223,326.54
206	5/13/2043	\$ 3,223,326.54	\$ 23,798.33	\$ 18,090.36	\$ 5,707.97	\$ 3,205,236.18
207	6/13/2043	\$ 3,205,236.18	\$ 23,798.33	\$ 18,122.39	\$ 5,675.94	\$ 3,187,113.79
208	7/13/2043	\$ 3,187,113.79	\$ 23,798.33	\$ 18,154.48	\$ 5,643.85	\$ 3,168,959.31
209	8/13/2043	\$ 3,168,959.31	\$ 23,798.33	\$ 18,186.63	\$ 5,611.70	\$ 3,150,772.67
210	9/13/2043	\$ 3,150,772.67	\$ 23,798.33	\$ 18,218.84	\$ 5,579.49	\$ 3,132,553.84
211	10/13/2043	\$ 3,132,553.84	\$ 23,798.33	\$ 18,251.10	\$ 5,547.23	\$ 3,114,302.74
212	11/13/2043	\$ 3,114,302.74	\$ 23,798.33	\$ 18,283.42	\$ 5,514.91	\$ 3,096,019.32
213	12/13/2043	\$ 3,096,019.32	\$ 23,798.33	\$ 18,315.80	\$ 5,482.53	\$ 3,077,703.52
214	1/13/2044	\$ 3,077,703.52	\$ 23,798.33	\$ 18,348.23	\$ 5,450.10	\$ 3,059,355.29

No.	Payment Date	Beginning Balance	Payment	Principal	Interest	Ending Balance
215	2/13/2044	\$ 3,059,355.29	\$ 23,798.33	\$ 18,380.72	\$ 5,417.61	\$ 3,040,974.57
216	3/13/2044	\$ 3,040,974.57	\$ 23,798.33	\$ 18,413.27	\$ 5,385.06	\$ 3,022,561.29
217	4/13/2044	\$ 3,022,561.29	\$ 23,798.33	\$ 18,445.88	\$ 5,352.45	\$ 3,004,115.42
218	5/13/2044	\$ 3,004,115.42	\$ 23,798.33	\$ 18,478.54	\$ 5,319.79	\$ 2,985,636.87
219	6/13/2044	\$ 2,985,636.87	\$ 23,798.33	\$ 18,511.27	\$ 5,287.07	\$ 2,967,125.61
220	7/13/2044	\$ 2,967,125.61	\$ 23,798.33	\$ 18,544.05	\$ 5,254.28	\$ 2,948,581.56
221	8/13/2044	\$ 2,948,581.56	\$ 23,798.33	\$ 18,576.88	\$ 5,221.45	\$ 2,930,004.68
222	9/13/2044	\$ 2,930,004.68	\$ 23,798.33	\$ 18,609.78	\$ 5,188.55	\$ 2,911,394.90
223	10/13/2044	\$ 2,911,394.90	\$ 23,798.33	\$ 18,642.74	\$ 5,155.60	\$ 2,892,752.16
224	11/13/2044	\$ 2,892,752.16	\$ 23,798.33	\$ 18,675.75	\$ 5,122.58	\$ 2,874,076.41
225	12/13/2044	\$ 2,874,076.41	\$ 23,798.33	\$ 18,708.82	\$ 5,089.51	\$ 2,855,367.59
226	1/13/2045	\$ 2,855,367.59	\$ 23,798.33	\$ 18,741.95	\$ 5,056.38	\$ 2,836,625.64
227	2/13/2045	\$ 2,836,625.64	\$ 23,798.33	\$ 18,775.14	\$ 5,023.19	\$ 2,817,850.50
228	3/13/2045	\$ 2,817,850.50	\$ 23,798.33	\$ 18,808.39	\$ 4,989.94	\$ 2,799,042.11
229	4/13/2045	\$ 2,799,042.11	\$ 23,798.33	\$ 18,841.69	\$ 4,956.64	\$ 2,780,200.42
230	5/13/2045	\$ 2,780,200.42	\$ 23,798.33	\$ 18,875.06	\$ 4,923.27	\$ 2,761,325.36
231	6/13/2045	\$ 2,761,325.36	\$ 23,798.33	\$ 18,908.48	\$ 4,889.85	\$ 2,742,416.88
232	7/13/2045	\$ 2,742,416.88	\$ 23,798.33	\$ 18,941.97	\$ 4,856.36	\$ 2,723,474.91
233	8/13/2045	\$ 2,723,474.91	\$ 23,798.33	\$ 18,975.51	\$ 4,822.82	\$ 2,704,499.40
234	9/13/2045	\$ 2,704,499.40	\$ 23,798.33	\$ 19,009.11	\$ 4,789.22	\$ 2,685,490.28
235	10/13/2045	\$ 2,685,490.28	\$ 23,798.33	\$ 19,042.78	\$ 4,755.56	\$ 2,666,447.51
236	11/13/2045	\$ 2,666,447.51	\$ 23,798.33	\$ 19,076.50	\$ 4,721.83	\$ 2,647,371.01
237	12/13/2045	\$ 2,647,371.01	\$ 23,798.33	\$ 19,110.28	\$ 4,688.05	\$ 2,628,260.74
238	1/13/2046	\$ 2,628,260.74	\$ 23,798.33	\$ 19,144.12	\$ 4,654.21	\$ 2,609,116.62
239	2/13/2046	\$ 2,609,116.62	\$ 23,798.33	\$ 19,178.02	\$ 4,620.31	\$ 2,589,938.60
240	3/13/2046	\$ 2,589,938.60	\$ 23,798.33	\$ 19,211.98	\$ 4,586.35	\$ 2,570,726.61
241	4/13/2046	\$ 2,570,726.61	\$ 23,798.33	\$ 19,246.00	\$ 4,552.33	\$ 2,551,480.61
242	5/13/2046	\$ 2,551,480.61	\$ 23,798.33	\$ 19,280.08	\$ 4,518.25	\$ 2,532,200.53
243	6/13/2046	\$ 2,532,200.53	\$ 23,798.33	\$ 19,314.23	\$ 4,484.11	\$ 2,512,886.30
244	7/13/2046	\$ 2,512,886.30	\$ 23,798.33	\$ 19,348.43	\$ 4,449.90	\$ 2,493,537.87
245	8/13/2046	\$ 2,493,537.87	\$ 23,798.33	\$ 19,382.69	\$ 4,415.64	\$ 2,474,155.18
246	9/13/2046	\$ 2,474,155.18	\$ 23,798.33	\$ 19,417.01	\$ 4,381.32	\$ 2,454,738.17
247	10/13/2046	\$ 2,454,738.17	\$ 23,798.33	\$ 19,451.40	\$ 4,346.93	\$ 2,435,286.77
248	11/13/2046	\$ 2,435,286.77	\$ 23,798.33	\$ 19,485.84	\$ 4,312.49	\$ 2,415,800.93
249	12/13/2046	\$ 2,415,800.93	\$ 23,798.33	\$ 19,520.35	\$ 4,277.98	\$ 2,396,280.58
250	1/13/2047	\$ 2,396,280.58	\$ 23,798.33	\$ 19,554.92	\$ 4,243.41	\$ 2,376,725.66
251	2/13/2047	\$ 2,376,725.66	\$ 23,798.33	\$ 19,589.55	\$ 4,208.79	\$ 2,357,136.11
252	3/13/2047	\$ 2,357,136.11	\$ 23,798.33	\$ 19,624.24	\$ 4,174.10	\$ 2,337,511.88
253	4/13/2047	\$ 2,337,511.88	\$ 23,798.33	\$ 19,658.99	\$ 4,139.34	\$ 2,317,852.89
254	5/13/2047	\$ 2,317,852.89	\$ 23,798.33	\$ 19,693.80	\$ 4,104.53	\$ 2,298,159.09
255	6/13/2047	\$ 2,298,159.09	\$ 23,798.33	\$ 19,728.67	\$ 4,069.66	\$ 2,278,430.42
256	7/13/2047	\$ 2,278,430.42	\$ 23,798.33	\$ 19,763.61	\$ 4,034.72	\$ 2,258,666.81
257	8/13/2047	\$ 2,258,666.81	\$ 23,798.33	\$ 19,798.61	\$ 3,999.72	\$ 2,238,868.20
258	9/13/2047	\$ 2,238,868.20	\$ 23,798.33	\$ 19,833.67	\$ 3,964.66	\$ 2,219,034.53
259	10/13/2047	\$ 2,219,034.53	\$ 23,798.33	\$ 19,868.79	\$ 3,929.54	\$ 2,199,165.74

No.	Payment Date	Beginning Balance	Payment	Principal	Interest	Ending Balance
260	11/13/2047	\$ 2,199,165.74	\$ 23,798.33	\$ 19,903.97	\$ 3,894.36	\$ 2,179,261.76
261	12/13/2047	\$ 2,179,261.76	\$ 23,798.33	\$ 19,939.22	\$ 3,859.11	\$ 2,159,322.54
262	1/13/2048	\$ 2,159,322.54	\$ 23,798.33	\$ 19,974.53	\$ 3,823.80	\$ 2,139,348.01
263	2/13/2048	\$ 2,139,348.01	\$ 23,798.33	\$ 20,009.90	\$ 3,788.43	\$ 2,119,338.11
264	3/13/2048	\$ 2,119,338.11	\$ 23,798.33	\$ 20,045.34	\$ 3,752.99	\$ 2,099,292.77
265	4/13/2048	\$ 2,099,292.77	\$ 23,798.33	\$ 20,080.83	\$ 3,717.50	\$ 2,079,211.94
266	5/13/2048	\$ 2,079,211.94	\$ 23,798.33	\$ 20,116.39	\$ 3,681.94	\$ 2,059,095.55
267	6/13/2048	\$ 2,059,095.55	\$ 23,798.33	\$ 20,152.02	\$ 3,646.32	\$ 2,038,943.53
268	7/13/2048	\$ 2,038,943.53	\$ 23,798.33	\$ 20,187.70	\$ 3,610.63	\$ 2,018,755.83
269	8/13/2048	\$ 2,018,755.83	\$ 23,798.33	\$ 20,223.45	\$ 3,574.88	\$ 1,998,532.38
270	9/13/2048	\$ 1,998,532.38	\$ 23,798.33	\$ 20,259.26	\$ 3,539.07	\$ 1,978,273.12
271	10/13/2048	\$ 1,978,273.12	\$ 23,798.33	\$ 20,295.14	\$ 3,503.19	\$ 1,957,977.98
272	11/13/2048	\$ 1,957,977.98	\$ 23,798.33	\$ 20,331.08	\$ 3,467.25	\$ 1,937,646.90
273	12/13/2048	\$ 1,937,646.90	\$ 23,798.33	\$ 20,367.08	\$ 3,431.25	\$ 1,917,279.82
274	1/13/2049	\$ 1,917,279.82	\$ 23,798.33	\$ 20,403.15	\$ 3,395.18	\$ 1,896,876.67
275	2/13/2049	\$ 1,896,876.67	\$ 23,798.33	\$ 20,439.28	\$ 3,359.05	\$ 1,876,437.39
276	3/13/2049	\$ 1,876,437.39	\$ 23,798.33	\$ 20,475.47	\$ 3,322.86	\$ 1,855,961.92
277	4/13/2049	\$ 1,855,961.92	\$ 23,798.33	\$ 20,511.73	\$ 3,286.60	\$ 1,835,450.19
278	5/13/2049	\$ 1,835,450.19	\$ 23,798.33	\$ 20,548.05	\$ 3,250.28	\$ 1,814,902.13
279	6/13/2049	\$ 1,814,902.13	\$ 23,798.33	\$ 20,584.44	\$ 3,213.89	\$ 1,794,317.69
280	7/13/2049	\$ 1,794,317.69	\$ 23,798.33	\$ 20,620.89	\$ 3,177.44	\$ 1,773,696.80
281	8/13/2049	\$ 1,773,696.80	\$ 23,798.33	\$ 20,657.41	\$ 3,140.92	\$ 1,753,039.39
282	9/13/2049	\$ 1,753,039.39	\$ 23,798.33	\$ 20,693.99	\$ 3,104.34	\$ 1,732,345.40
283	10/13/2049	\$ 1,732,345.40	\$ 23,798.33	\$ 20,730.64	\$ 3,067.69	\$ 1,711,614.76
284	11/13/2049	\$ 1,711,614.76	\$ 23,798.33	\$ 20,767.35	\$ 3,030.98	\$ 1,690,847.42
285	12/13/2049	\$ 1,690,847.42	\$ 23,798.33	\$ 20,804.12	\$ 2,994.21	\$ 1,670,043.30
286	1/13/2050	\$ 1,670,043.30	\$ 23,798.33	\$ 20,840.96	\$ 2,957.37	\$ 1,649,202.33
287	2/13/2050	\$ 1,649,202.33	\$ 23,798.33	\$ 20,877.87	\$ 2,920.46	\$ 1,628,324.46
288	3/13/2050	\$ 1,628,324.46	\$ 23,798.33	\$ 20,914.84	\$ 2,883.49	\$ 1,607,409.62
289	4/13/2050	\$ 1,607,409.62	\$ 23,798.33	\$ 20,951.88	\$ 2,846.45	\$ 1,586,457.75
290	5/13/2050	\$ 1,586,457.75	\$ 23,798.33	\$ 20,988.98	\$ 2,809.35	\$ 1,565,468.77
291	6/13/2050	\$ 1,565,468.77	\$ 23,798.33	\$ 21,026.15	\$ 2,772.18	\$ 1,544,442.62
292	7/13/2050	\$ 1,544,442.62	\$ 23,798.33	\$ 21,063.38	\$ 2,734.95	\$ 1,523,379.24
293	8/13/2050	\$ 1,523,379.24	\$ 23,798.33	\$ 21,100.68	\$ 2,697.65	\$ 1,502,278.56
294	9/13/2050	\$ 1,502,278.56	\$ 23,798.33	\$ 21,138.05	\$ 2,660.28	\$ 1,481,140.52
295	10/13/2050	\$ 1,481,140.52	\$ 23,798.33	\$ 21,175.48	\$ 2,622.85	\$ 1,459,965.04
296	11/13/2050	\$ 1,459,965.04	\$ 23,798.33	\$ 21,212.98	\$ 2,585.35	\$ 1,438,752.06
297	12/13/2050	\$ 1,438,752.06	\$ 23,798.33	\$ 21,250.54	\$ 2,547.79	\$ 1,417,501.52
298	1/13/2051	\$ 1,417,501.52	\$ 23,798.33	\$ 21,288.17	\$ 2,510.16	\$ 1,396,213.35
299	2/13/2051	\$ 1,396,213.35	\$ 23,798.33	\$ 21,325.87	\$ 2,472.46	\$ 1,374,887.48
300	3/13/2051	\$ 1,374,887.48	\$ 23,798.33	\$ 21,363.63	\$ 2,434.70	\$ 1,353,523.85
301	4/13/2051	\$ 1,353,523.85	\$ 23,798.33	\$ 21,401.47	\$ 2,396.87	\$ 1,332,122.38
302	5/13/2051	\$ 1,332,122.38	\$ 23,798.33	\$ 21,439.36	\$ 2,358.97	\$ 1,310,683.02
303	6/13/2051	\$ 1,310,683.02	\$ 23,798.33	\$ 21,477.33	\$ 2,321.00	\$ 1,289,205.69
304	7/13/2051	\$ 1,289,205.69	\$ 23,798.33	\$ 21,515.36	\$ 2,282.97	\$ 1,267,690.32

No.	Payment Date	Beginning Balance	Payment	Principal	Interest	Ending Balance
305	8/13/2051	\$ 1,267,690.32	\$ 23,798.33	\$ 21,553.46	\$ 2,244.87	\$ 1,246,136.86
306	9/13/2051	\$ 1,246,136.86	\$ 23,798.33	\$ 21,591.63	\$ 2,206.70	\$ 1,224,545.23
307	10/13/2051	\$ 1,224,545.23	\$ 23,798.33	\$ 21,629.87	\$ 2,168.47	\$ 1,202,915.37
308	11/13/2051	\$ 1,202,915.37	\$ 23,798.33	\$ 21,668.17	\$ 2,130.16	\$ 1,181,247.20
309	12/13/2051	\$ 1,181,247.20	\$ 23,798.33	\$ 21,706.54	\$ 2,091.79	\$ 1,159,540.66
310	1/13/2052	\$ 1,159,540.66	\$ 23,798.33	\$ 21,744.98	\$ 2,053.35	\$ 1,137,795.68
311	2/13/2052	\$ 1,137,795.68	\$ 23,798.33	\$ 21,783.48	\$ 2,014.85	\$ 1,116,012.20
312	3/13/2052	\$ 1,116,012.20	\$ 23,798.33	\$ 21,822.06	\$ 1,976.27	\$ 1,094,190.14
313	4/13/2052	\$ 1,094,190.14	\$ 23,798.33	\$ 21,860.70	\$ 1,937.63	\$ 1,072,329.44
314	5/13/2052	\$ 1,072,329.44	\$ 23,798.33	\$ 21,899.41	\$ 1,898.92	\$ 1,050,430.02
315	6/13/2052	\$ 1,050,430.02	\$ 23,798.33	\$ 21,938.19	\$ 1,860.14	\$ 1,028,491.83
316	7/13/2052	\$ 1,028,491.83	\$ 23,798.33	\$ 21,977.04	\$ 1,821.29	\$ 1,006,514.78
317	8/13/2052	\$ 1,006,514.78	\$ 23,798.33	\$ 22,015.96	\$ 1,782.37	\$ 984,498.82
318	9/13/2052	\$ 984,498.82	\$ 23,798.33	\$ 22,054.95	\$ 1,743.38	\$ 962,443.88
319	10/13/2052	\$ 962,443.88	\$ 23,798.33	\$ 22,094.00	\$ 1,704.33	\$ 940,349.87
320	11/13/2052	\$ 940,349.87	\$ 23,798.33	\$ 22,133.13	\$ 1,665.20	\$ 918,216.74
321	12/13/2052	\$ 918,216.74	\$ 23,798.33	\$ 22,172.32	\$ 1,626.01	\$ 896,044.42
322	1/13/2053	\$ 896,044.42	\$ 23,798.33	\$ 22,211.59	\$ 1,586.75	\$ 873,832.84
323	2/13/2053	\$ 873,832.84	\$ 23,798.33	\$ 22,250.92	\$ 1,547.41	\$ 851,581.92
324	3/13/2053	\$ 851,581.92	\$ 23,798.33	\$ 22,290.32	\$ 1,508.01	\$ 829,291.60
325	4/13/2053	\$ 829,291.60	\$ 23,798.33	\$ 22,329.79	\$ 1,468.54	\$ 806,961.80
326	5/13/2053	\$ 806,961.80	\$ 23,798.33	\$ 22,369.34	\$ 1,428.99	\$ 784,592.47
327	6/13/2053	\$ 784,592.47	\$ 23,798.33	\$ 22,408.95	\$ 1,389.38	\$ 762,183.52
328	7/13/2053	\$ 762,183.52	\$ 23,798.33	\$ 22,448.63	\$ 1,349.70	\$ 739,734.89
329	8/13/2053	\$ 739,734.89	\$ 23,798.33	\$ 22,488.38	\$ 1,309.95	\$ 717,246.51
330	9/13/2053	\$ 717,246.51	\$ 23,798.33	\$ 22,528.21	\$ 1,270.12	\$ 694,718.30
331	10/13/2053	\$ 694,718.30	\$ 23,798.33	\$ 22,568.10	\$ 1,230.23	\$ 672,150.20
332	11/13/2053	\$ 672,150.20	\$ 23,798.33	\$ 22,608.06	\$ 1,190.27	\$ 649,542.13
333	12/13/2053	\$ 649,542.13	\$ 23,798.33	\$ 22,648.10	\$ 1,150.23	\$ 626,894.03
334	1/13/2054	\$ 626,894.03	\$ 23,798.33	\$ 22,688.21	\$ 1,110.12	\$ 604,205.83
335	2/13/2054	\$ 604,205.83	\$ 23,798.33	\$ 22,728.38	\$ 1,069.95	\$ 581,477.44
336	3/13/2054	\$ 581,477.44	\$ 23,798.33	\$ 22,768.63	\$ 1,029.70	\$ 558,708.81
337	4/13/2054	\$ 558,708.81	\$ 23,798.33	\$ 22,808.95	\$ 989.38	\$ 535,899.86
338	5/13/2054	\$ 535,899.86	\$ 23,798.33	\$ 22,849.34	\$ 948.99	\$ 513,050.52
339	6/13/2054	\$ 513,050.52	\$ 23,798.33	\$ 22,889.80	\$ 908.53	\$ 490,160.72
340	7/13/2054	\$ 490,160.72	\$ 23,798.33	\$ 22,930.34	\$ 867.99	\$ 467,230.38
341	8/13/2054	\$ 467,230.38	\$ 23,798.33	\$ 22,970.94	\$ 827.39	\$ 444,259.44
342	9/13/2054	\$ 444,259.44	\$ 23,798.33	\$ 23,011.62	\$ 786.71	\$ 421,247.81
343	10/13/2054	\$ 421,247.81	\$ 23,798.33	\$ 23,052.37	\$ 745.96	\$ 398,195.44
344	11/13/2054	\$ 398,195.44	\$ 23,798.33	\$ 23,093.19	\$ 705.14	\$ 375,102.25
345	12/13/2054	\$ 375,102.25	\$ 23,798.33	\$ 23,134.09	\$ 664.24	\$ 351,968.16
346	1/13/2055	\$ 351,968.16	\$ 23,798.33	\$ 23,175.05	\$ 623.28	\$ 328,793.11
347	2/13/2055	\$ 328,793.11	\$ 23,798.33	\$ 23,216.09	\$ 582.24	\$ 305,577.02
348	3/13/2055	\$ 305,577.02	\$ 23,798.33	\$ 23,257.20	\$ 541.13	\$ 282,319.81
349	4/13/2055	\$ 282,319.81	\$ 23,798.33	\$ 23,298.39	\$ 499.94	\$ 259,021.42

No.	Payment Date	Beginning Balance	Payment	Principal	Interest	Ending Balance
350	5/13/2055	\$ 259,021.42	\$ 23,798.33	\$ 23,339.65	\$ 458.68	\$ 235,681.77
351	6/13/2055	\$ 235,681.77	\$ 23,798.33	\$ 23,380.98	\$ 417.35	\$ 212,300.80
352	7/13/2055	\$ 212,300.80	\$ 23,798.33	\$ 23,422.38	\$ 375.95	\$ 188,878.41
353	8/13/2055	\$ 188,878.41	\$ 23,798.33	\$ 23,463.86	\$ 334.47	\$ 165,414.56
354	9/13/2055	\$ 165,414.56	\$ 23,798.33	\$ 23,505.41	\$ 292.92	\$ 141,909.15
355	10/13/2055	\$ 141,909.15	\$ 23,798.33	\$ 23,547.03	\$ 251.30	\$ 118,362.11
356	11/13/2055	\$ 118,362.11	\$ 23,798.33	\$ 23,588.73	\$ 209.60	\$ 94,773.38
357	12/13/2055	\$ 94,773.38	\$ 23,798.33	\$ 23,630.50	\$ 167.83	\$ 71,142.88
358	1/13/2056	\$ 71,142.88	\$ 23,798.33	\$ 23,672.35	\$ 125.98	\$ 47,470.53
359	2/13/2056	\$ 47,470.53	\$ 23,798.33	\$ 23,714.27	\$ 84.06	\$ 23,756.26
360	3/13/2056	\$ 23,756.26	\$ 23,798.33	\$ 23,756.26	\$ 42.07	\$ 0.00

No.	Payment Date	Beginning Balance	Payment	Principal	Interest	Ending Balance
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No.	Payment Date	Beginning Balance	Payment	Principal	Interest	Ending Balance
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Alternatives Description Details	
System Component Type:	Collection
System Component Name:	Force Main and Septic Elimination
Description	
Alternative Name:	No Action (Alternative 1)
Is this alternate solution feasible or is it not feasible?	
Feasibility	No

System Component Type: Collection**System Component Name:** Force Main and
Septic Retirement**Alternative Name:** Vacuum Sewer (Alternative 2)**Alternative 2****Vacuum Sewer**

Lifecycle Cost Analysis Details	Value
Planning Period, Years	20
Expected/Useful Life of System Component, Years	30
Real Discount Rate	0.4%
Salvage Value (SV)	1,526,238
Total Capital Costs	6,643,000
Annual Operations and Maintenance (O&M)	573,500
Single Present Payment Worth Factor	0.9233
Single Payment Present Worth (SPPW) of SV	1,409,175
Uniform Series Present Worth Factor	19.1841
Uniform Series Present Worth of O&M	11,002,081
Net Present Value (NPV)	16,235,906

Net Present Worth Analysis

The NPV Analysis tool uses the Lifecycle Analysis Details to calculate the present worth of an investment relative to the length of time of the planning period and the useful life of the project. This approach helps to compare the overall value of a proposed alternative in present worth compared to other alternatives subjected to the same financial analysis.

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

Capital Cost (C)

Present Worth of the uniform series of annual O&M USPW (O&M)

Single payment present worth of the salvage value SPPW(S)

System Component Type: Collection**System Component Name:** Force Main and Septic Retirement**Alternative Name:** Conventional Sewer (Alternative 3)**Alternative 3****Conventional Sewer**

Lifecycle Cost Analysis Details	Value
Planning Period, Years	20
Expected/Useful Life of System Component, Years	30
Real Discount Rate	0.4%
Salvage Value (SV)	1,443,068
Total Capital Costs	6,281,000
Annual Operations and Maintenance (O&M)	573,500
Single Present Payment Worth Factor	0.9233
Single Payment Present Worth (SPPW) of SV	1,332,383
Uniform Series Present Worth Factor	19.1841
Uniform Series Present Worth of O&M	11,002,081
Net Present Value (NPV)	15,950,697

Net Present Worth Analysis

The NPV Analysis tool uses the Lifecycle Analysis Details to calculate the present worth of an investment relative to the length of time of the planning period and the useful life of the project. This approach helps to compare the overall value of a proposed alternative in present worth compared to other alternatives subjected to the same financial analysis.

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

Capital Cost (C)

Present Worth of the uniform series of annual O&M USPW (O&M)

Single payment present worth of the salvage value SPPW(S)

System Component Type: Collection**System Component Name:** Force Main and
Septic Retirement**Alternative Name:** Grinder Pump Systems (Alternative 4)**Alternative 4****Grinder Pump Systems**

Lifecycle Cost Analysis Details	Value
Planning Period, Years	20
Expected/Useful Life of System Component, Years	30
Real Discount Rate	0.4%
Salvage Value (SV)	1,608,718
Total Capital Costs	7,002,000
Annual Operations and Maintenance (O&M)	400,000
Single Present Payment Worth Factor	0.9233
Single Payment Present Worth (SPPW) of SV	1,485,330
Uniform Series Present Worth Factor	19.1841
Uniform Series Present Worth of O&M	7,673,640
Net Present Value (NPV)	13,190,310

Net Present Worth Analysis

The NPV Analysis tool uses the Lifecycle Analysis Details to calculate the present worth of an investment relative to the length of time of the planning period and the useful life of the project. This approach helps to compare the overall value of a proposed alternative in present worth compared to other alternatives subjected to the same financial analysis.

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

Capital Cost (C)

Present Worth of the uniform series of annual O&M USPW (O&M)

Single payment present worth of the salvage value SPPW(S)

System Component Type: Collection**System Component Name:** Force Main and Septic Retirement**Alternative Name:** STE & STEP System (Alternative 5)**Alternative 5****STE and STEP System**

Lifecycle Cost Analysis Details	Value
Planning Period, Years	20
Expected/Useful Life of System Component, Years	30
Real Discount Rate	0.4%
Salvage Value (SV)	1,454,555
Total Capital Costs	6,331,000
Annual Operations and Maintenance (O&M)	365,000
Single Present Payment Worth Factor	0.9233
Single Payment Present Worth (SPPW) of SV	1,343,017
Uniform Series Present Worth Factor	19.1841
Uniform Series Present Worth of O&M	7,002,197
Net Present Value (NPV)	11,990,206

Net Present Worth Analysis

The NPV Analysis tool uses the Lifecycle Analysis Details to calculate the present worth of an investment relative to the length of time of the planning period and the useful life of the project. This approach helps to compare the overall value of a proposed alternative in present worth compared to other alternatives subjected to the same financial analysis.

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

Capital Cost (C)

Present Worth of the uniform series of annual O&M USPW (O&M)

Single payment present worth of the salvage value SPPW(S)

Selection of Alternative - Non-Monetary Factors

System Component Type: Collection

System Component Name: Force Main and
Septic Retirement

Non-Monetary Factors						
Alternative Name	Social Considerations	Environmental Considerations	Regulatory Considerations	Operational Considerations	Total	Best
Vacuum Sewer (Alternative 2)	3	5	6	3	17	
Conventional Sewer (Alternative 3)	4	6	7	9	26	
Grinder Pump Systems (Alternative 4)	7	9	8	5	29	
STE & STEP System (Alternative 5)	8	9	8	8	33	✓

Non-Monetary Factors

- The larger diameter of gravity sewers will induce interest in the development of undeveloped farm and residential area in the two community service areas. The pipe diameters for the conventional sewers will allow more connections than the other alternative sewer technologies.
- Conventional sewer components for both sewer and pumpstation construction, maintenance and repair are available on the open market. Thus, costs and service responsiveness are controllable. Whereas, proprietary systems like grinder pump and vacuum create a marriage between the sewer authority and the component vendor that limits the ability to control costs.
- STEP systems provide the low-maintenance and reliability of a conventional gravity system while eliminating the stormwater exposure and the topographical constraints associated with gravity.
- STEP systems also provide a significantly longer-lasting pump type than the grinder pump systems which leads to less maintenance and cost in the long run.

Selection of Alternative - Alternative Selection Summary

System Component Type: Collection

System Component Name: Force Main and
Septic Retirement

Alternative List

Alternative Selected	Alternative Name	NPV	Best NPV	Non-Monetary Factor	Best Non-Monetary Factor
✓	STE & STEP System (Alternative 5)	11,990,206	✓	33	✓
	Grinder Pump System (Alternative 4)	13,190,310		29	
	Conventional Sewer (Alternative 3)	15,950,697		28	
	Vacuum Sewer (Alternative 2)	16,235,906		17	

i. An STE-STEP system is recommended

- i. All sewer alternatives require the construction of sewers in the area roadways. The main concerns with the laying of sewer pipes in roadways are associated with the high water table, spoil volume, plastic sticky soils, requirements for refill of pipe trenches, concern for preservation of the existing stormwater ditch system.
- ii. The primary solution to these sewer related concerns is to keep collector sewer excavation as shallow as possible. STE-STEP technology facilitates keeping the pipes shallow.
- iii. Construction of sewer mains and laterals may be restricted to the months of June through November to minimize soil and soil moisture related problems.
- iv. Excavated soil may be allowed as trench backfill if moisture content is not sufficient to allow plasticity or stickyness
- v. The perceived disqualifier of STE-STEP sewers from a construction perspective is the need to replace the septic tank. The challenge becomes less of a negative when factored in is the requirement that the existing septic tank **MUST** be removed and replaced.
- vi. The replacement tank should be plastic formed using polyethylene or fiber reinforced plastic. Plastic tanks can be hand carried to difficult to access locations and installed using backhoe alone.
- vii. The designer should work with a recognized leader in septic tank manufacture to adapt septic tank and effluent pump design and installation specifications.
- viii. The design engineer should produce a plan to incorporate as much trenchless technology as possible and sensible into the construction of the sewer system.
- ix. A minimum of one pump station may be required. However, The designer should evaluate pump selection and system hydraulics with the intent that a pump station may be omitted. Ideally the effluent pumps themselves would pump wastewater from the user septic tank to the Tilghman sewer.
- x. The pump station(s) if required should be provided with sewerage flow and pump runtime recording capability.

- xi. Individual customer pump controls should include a run timer and data logger.
- xii. Pump stations serving multiple STE sites should be constructed and brought on line first without a time of year constraint. However, pump station construction during the dry spring, summer, and fall would encounter fewer problems.
- xiii. A STEP system for Fairbanks and Bar Neck will fit right in with the experience and capabilities of the St. Michaels area sewer utility management.
- xiv. STEP high head pumps provide the longest service life expectancy.

System Type

The preliminary design for the septic elimination system includes installation of new STEP tanks on each occupied lot within the project area. This lot total sits at 124 lots with 104 being improved and ready for immediate connection. The 20 lots in the project area will be provided a stub-out from the proposed sewer main for ease of future connection. To serve these STEP systems, small diameter sewer main will be installed along Black Walnut Point Road and Bar Neck Road in the communities of Fairbank and Bar Neck. An additional length of larger diameter sewer main will be installed along Black Walnut Point Road and connect to an existing 12" gravity main within the Region V collection system in Tilghman.

Sewer Force Main

To serve the STEP tanks installed on each occupied lot, Talbot County proposes the installation of 18,500 LF of sewer main of varying sizes to serve the individual communities along Black Walnut Point Road and Bar Neck Road. Smaller diameter sewer mains will be installed in the community areas and a larger diameter main will be installed along Black Walnut Point Road and connect into an existing 12" gravity main in Tilghman. This connection will allow the STEP tank effluent to be sent to the existing Region V collection system and treated by the WWTP located in Tilghman.

Bullet Point Actions

- Collapse or remove existing septic tanks as necessary
- Install new STEP tanks on each occupied lot within the project area and ensure anti-floatation measures such as tie-downs and tank design are specified during tank selection
- Install a total of 18,500 LF of sewer main of varying sizes to serve communities and tie into the existing Region V collection system
- Provide stubs from installed sewer main for unoccupied lots within the project area for future connections
- Restore all temporary disturbances associated with STEP tank installation and sewer main installation
- Restore any road surface cuts associated with individual lot connections

Residential Site Restoration

Each sewer extension connection and STEP tank installed on a residential lot will require lot restoration to pre-installation condition including any required fill, leveling, and grass seeding. This fill, leveling, and seeding will suffice for most lot disturbance. However, a uniform approach for each homeowner will inevitably cause some homeowners to be unhappy with lot restoration and landscaping conducted by the County and their contractors. With this understanding, it is recommended that each site be documented with photographs prior to any disturbance. Once the installation and standard remediation is completed, the homeowner may contact the County if they are unsatisfied with the restoration. The County will determine whether a discrepancy exists between the original and remediated lot conditions. Any costs above the budgeted costs will be allocated from the project contingency budget.

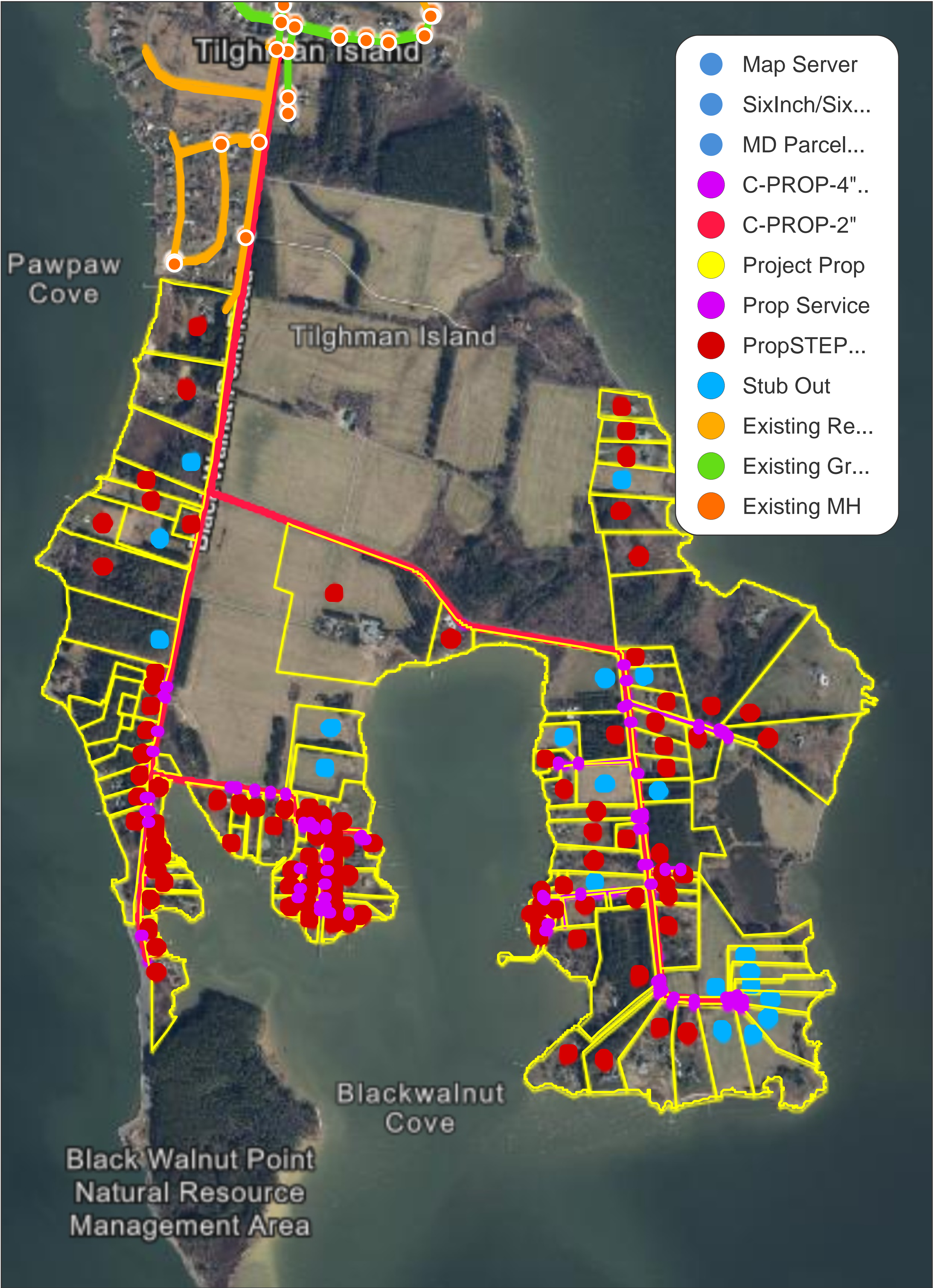
Details for Proposed Project - Waste Water Collection		
Wastewater Collection Types Type		
✓ Small Diameter	✓ Effluent Pumps	✓ Pump Station/Forcemain

Proposed STEP System

Talbot County proposes to eliminate the septic systems by extending the sewer system from the existing Tilghman Island sewer district to the Fairbank and Bar Neck village centers on Tilghman Island, Talbot County, Maryland. The preferred method is the use of a small diameter pressure pipe sewer system which contains only the pumped septic tank effluent. This is known as Septic Tank Effluent Pumping (STEP) system. The STEP system may allow the County to minimize the capital expenditures that will need to be made by the property owners and could reduce the overall site disturbance if the new tanks are installed in existing septic tank areas. By using a STEP system with effluent pumps instead of a grinder type pump system, the County may initially save money by not having to pump out the tanks, collapsing the tank with fill imported to restore the site, and installing a smaller grinder pump fiberglass tank. The financial incentives, the ease of use, and the minimal maintenance associated with the STEP system make it the preferred alternative for the County to pursue.

Service Lots

There are 124 lots proposed to be served by the STEP system. 104 improved lots are proposed for immediate connection.



Smart Site Plan™	Alternative 5 - S...	<div>N</div> <div>↑</div>	SCALE	1" = 346 ft <div>└───┘</div>
			DATE	Mar 13, 2026

Force Mains

Force mains of 2" and 4" diameter HDPE will be used to extend Region V sewer service from the Tilghman WWTP to the villages of Faribank and Bar Neck. The total length will be 9,300 LF of 2" and 10,500 LF of 4" main.





- SixInch/SixInchImagery
- C-PROP-2FM
- C-PROP-4FM
- Project Properties
- Proposed Residential Con...
- PropSTEP/STP Tank/System
- Stub Out





Project Schedule Notes

The proposed project schedule assumes completion of the Preliminary Engineering Report (PER) in March 2026, followed by agency review, final design, permitting, right-of-way and easement acquisition, bidding, and construction. The schedule anticipates approximately six months for final design and approximately four months for regulatory review and permitting. Construction bidding and contractor selection are anticipated to occur in mid-2027, with construction beginning shortly thereafter. The anticipated construction duration for the collection system improvements, force mains, and associated work is approximately 15 to 16 months.

Coordination with regulatory agencies, including the Maryland Department of the Environment and other applicable state and local agencies, will occur during the design and permitting phases. Easement acquisition and property coordination will proceed concurrently with final design to minimize schedule delays. The schedule assumes timely review and approval of permit applications and design documents.

Construction sequencing will be planned to minimize disruption to residents and traffic while maintaining access for emergency services. Temporary traffic control measures will be implemented where necessary, and work will be staged to limit impacts to individual neighborhoods or roadway segments at any given time.

Road reconstruction during the wet season should be restricted because the high-water table in the project area can saturate the roadway subgrade and fill materials. Under saturated conditions, normal vehicle traffic can produce a phenomenon known as pumping, where repetitive wheel loads force water upward from the saturated groundwater level into the shallow roadway fill. The mixture of water and soil can lose strength, effectively liquefying and becoming displaced under wheel loads. These conditions accelerate the formation of potholes, settlement, and surface failure.

If roadway reconstruction occurs during periods of high groundwater or prolonged precipitation, the risk of pavement failure increases significantly. Excessive settlement, pothole formation, and soil instability may create hazardous conditions for motorists and may limit the ability of heavy emergency vehicles to safely access affected areas. For these reasons, roadway reconstruction and final pavement restoration should be scheduled during drier periods of the year when subgrade conditions are more stable.

Appropriate construction management practices, including temporary stabilization, dewatering where necessary, and phased roadway restoration, will be implemented to reduce the potential for roadway failure during construction activities.

Land Rights	
Number of Acres To Be Acquired - Fee Simple	0
Number of Acres To Be Acquired - Lease	.0
Acres To Be Acquired - Purchase Price	\$0.00
Acres To Be Acquired - Value	\$0.00
Number of Acres Now Owned - Fee Simple	.0
Number of Acres Now Owned - Lease	.0
Acres Now Owned - Purchase Price	\$.00
Acres Now Owned - Value	\$.00
Describe Other Rights (such as water rights or rights-of-way)	Rights of way must be acquired for each lot where sewer service is extended to maintain the STEP system and force main connection.

Pumping Station

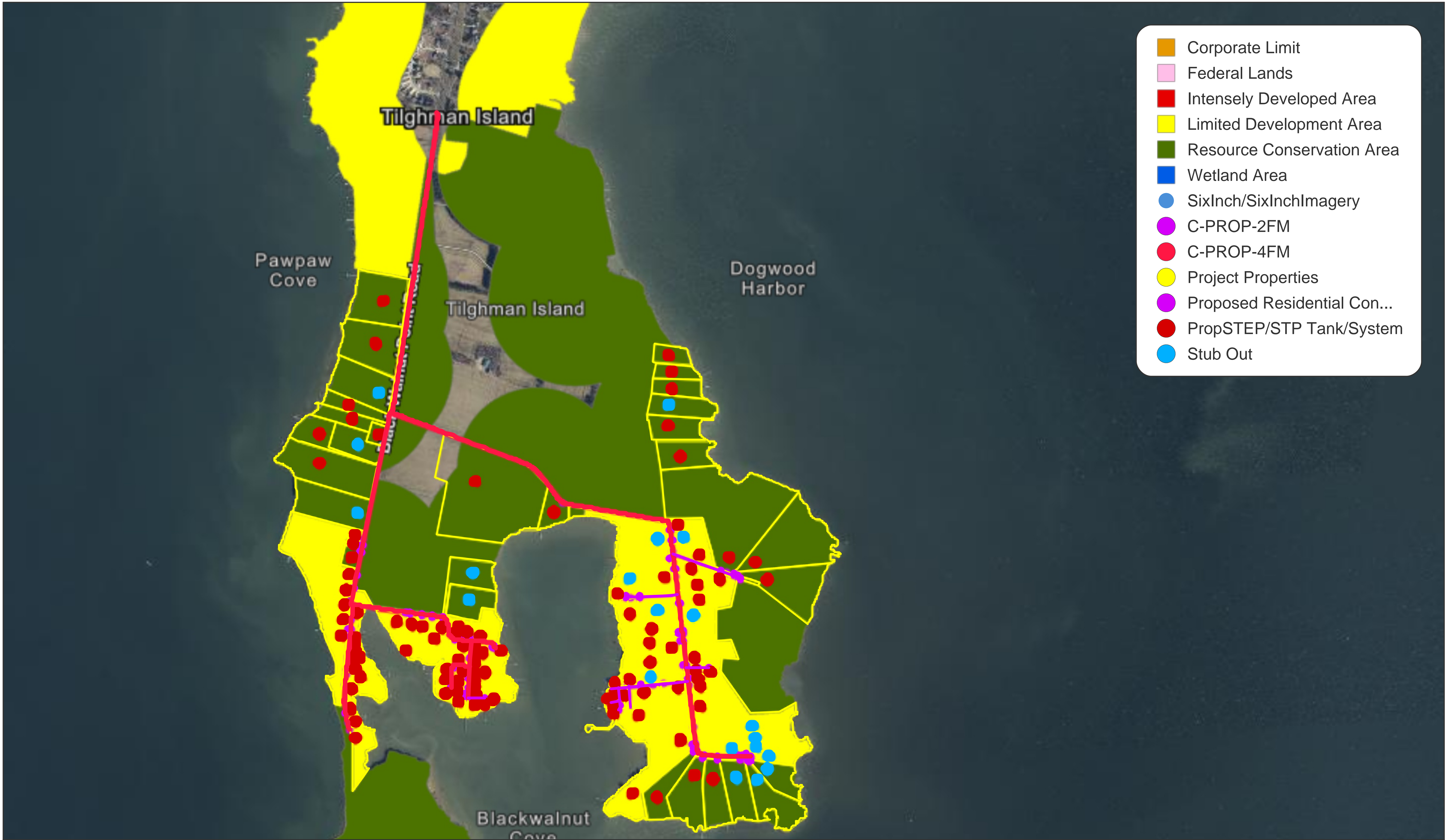
The proposed system does not require construction of a centralized pump station. Based on the design assumptions used for this analysis, the individual STEP pump systems provide sufficient discharge head to overcome friction losses along the length of the force main. As a result, wastewater can be conveyed directly from the villages of Fairbank and Bar Neck to the existing gravity sewer system.

Because a centralized pump station is not required, the project does not require acquisition of land for pump station construction along the Route 33 corridor. Previous conceptual layouts considered the potential need for a small pump station parcel along Black Walnut Point Road; however, under the proposed STEP system configuration, the individual pump units provide adequate hydraulic capacity to convey flow to the southernmost gravity manhole in the existing Region V collection system. Consequently, no subdivision or purchase of property from Map/Grid/Parcel 0044,0022,0021, owned by John Swain III and Tina Petrovich under Chesapeake Farms LLC, will be required for this project.

Eliminating the need for a centralized pump station reduces project complexity, minimizes permitting requirements associated with wetlands and floodplain impacts, and avoids the need for additional land acquisition along the project alignment.

Expected Permit Requirements

- **E&SC permits**
- **NPDES**
- **Wetland license if wetland acre affected**
- **Proximity to 100-year flood plain**
- **Stormwater Management permit**
- **County Road Department approvals**
- **County grading permits - SEC**
- **Electrical and Plumbing Permits**
- **State Highway Administration (SHA) Permit**
- **Sanitary Construction Permit (MDE)**
- **Building Permit**
- **Limited Development Area Review (Critical Area Commission)**



Community Planning

A sewer solution to the Fairbanks Bar Neck communities will increase the incentive for land development by removing the current disincentives associated with wastewater management. Presently, development is focused on the nearby Tilghman Island community because it is served by municipal sewer. A sewer solution for Fairbanks and Bar Neck would connect these communities to the Tilghman Island sewer system. The Fairbanks Bar Neck area currently provides some of the most affordable residential real estate in this area of Talbot County. Sewer associated development would allow much higher residential density than would be allowed under current land use regulations. The value of the tradeoff where reduced health and environmental risk is achieved in return for higher density development is difficult to quantify. The development incentive associated with the construction of sewer service to the project area will in the near future (through 2050) likely lead to the development of much of the farmland between the Tilghman Island community and the Fairbanks Bar Neck areas. The area's natural beauty, the population exodus from the nearby large cities (Washington, Baltimore, and Philadelphia), and the increasing value of undeveloped land will drive the effort to develop Fairbanks, Bar Neck, Tilghman, and the area between Tilghman and Fairbanks Bar Neck. The Fairbanks Bar Neck neighborhoods will be gentrified and redeveloped with the loss of affordable housing.

Wells

All properties in the project area are served by on site well water supplies. Although an on the ground survey of the proximity of wells and septic systems in the project area was not performed, from a drive by perspective it is difficult to envision an arrangement of wells and septs that provide sufficient separation.

STEP System Longevity

STEP systems can last 20 years or longer with no major component repair or replacement. This allows a STEP system to sustainably serve a community with a high degree of reliability. Below are estimated lifespans for STEP system components.

- Septic Tank - 50 years
- Effluent Pump - 20 years
- Control Floats (2) - 10 years
- Effluent Filter - 20 years
- Collection Mains - 50 years
- Tank Pump-Outs - Every 10 years, on average

Total Project Cost (Engineer's Opinion of Probable Cost)

Recommended Alternative – Alternative 5

STE & STEP System

Cost Classification	Description	Cost
Development (Construction)	STEP Tank / Pump / Controls (104 Units)	1,560,000
Development (Construction)	2-inch Force Main – 9,500 LF	360,000
Development (Construction)	4-inch Force Main – 12,210 LF	670,000
Development (Construction)	Service Line	55,000
Development (Construction)	Abandonment of Existing Tanks	660,000
Development (Construction)	Driveway Trench Repair	100,000
Development (Construction)	Sediment Control	75,000
Development (Construction)	County Road Pavement Restoration	220,000
Development (Construction)	Restoration	15,000
Development (Construction)	Traffic Control	35,000
Development (Construction)	Site Remediation	210,000
Development (Construction)	Mobilization (10%)	396,000

Subtotal Construction

4,356,000

Non-Construction Costs

Cost Classification	Description	Cost
Architectural, Engineering & Planning	Engineering Planning and Design	390,000
Engineering – Construction Administration	Construction Phase Services (CM, CI, Engineering Support)	540,000
Legal Services	Administration and Legal	175,000
Contingency	Contingency (20% Construction)	870,000

Total non-construction**1,975,000**

Total Project Cost**6,331,000**

Project Cost

The cost estimate for the recommended Alternative 5 (STE & STEP System) is based in part on preliminary system configuration and equipment information provided by Orenco Systems for a Prelos Sewer™ STEP collection system. The project area consists of 124 total lots, of which 104 are currently occupied and 20 are undeveloped lots reserved for future connections. Wastewater from the service area will be conveyed through a pressurized collection network to an existing gravity manhole within the Tilghman Island service area located approximately 10,000 feet from the project area.

The recommended system utilizes individual Orenco Prelos Processor STEP units located at each occupied residence. Each processor consists of a septic tank equipped with an effluent pump, Bio-tube filter, control panel, and associated electrical components packaged as a complete unit. The Prelos Processor is designed to simplify installation and reduce on-lot construction variability by providing a factory-assembled treatment and pumping unit.

For purposes of this planning-level estimate, the project assumes installation of 104 STEP systems for existing residences. In addition, 20 service stub-outs are included for future undeveloped lots, allowing the remaining parcels to connect to the system when development occurs without requiring major extensions to the collection system. The budget assumes an average installed cost of approximately 15,000 per STEP system, which includes the septic tank, effluent pump assembly, control panel, electrical connections, and associated installation costs. Actual installation costs may vary depending on site conditions, electrical service availability, and tank sizing requirements.

The proposed collection system consists primarily of small-diameter pressurized force mains, generally ranging from 2-inch to 4-inch diameter pipe, consistent with typical STEP system design standards. Because solids are retained within the septic tank and screened prior to pumping, smaller diameter pipes can be used and installed at relatively shallow depths. This approach reduces excavation requirements and helps minimize impacts associated with high groundwater conditions commonly encountered in the project area.

The estimate includes allowances for roadway restoration, driveway trench repair, abandonment of existing septic tanks, erosion and sediment control, traffic control, and general site restoration. These costs reflect anticipated construction conditions along Route 33 and local roadways serving the project area.

Mobilization costs are assumed to be approximately 10 percent of the construction subtotal, consistent with typical contractor mobilization costs for projects of this scale. Engineering services, construction administration, and legal services are included as non-construction costs based on typical percentages associated with planning, design, and construction phase services. A contingency allowance of 20 percent of construction costs has been included to account for uncertainties associated with preliminary design assumptions, subsurface conditions, permitting requirements, and potential material cost fluctuations.

The costs presented represent a planning-level engineer's opinion of probable cost and are intended primarily for comparison of alternatives during the preliminary engineering phase. Final construction costs will depend on detailed design, contractor bids, material pricing at the time of construction, and regulatory permitting requirements.

Annual Operating Budget - Income		
Type of Income	Description	Yearly Income
Operating Income - Retail	Sewer Service Charges	\$348,253.00
Other Operating Income	Sewer Connection Charges	\$7,450.00
Other Operating Income	Residential Benefit Charges	\$20,741.00
	Total:	\$376,444.00

Income From Business Activities.

The current sewer use rates for Talbot County Region V Tilghman District is \$380 per connection annually. The existing budget for sewer service revenue without the Fairbank Bar Neck Sewer Service Extension sits at \$314,813 annually. The "Annual Operating Budget - Income" table above reflects the anticipated revenue upon project completion.



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Wastewater Treatment

St. Michaels

Wastewater Treatment

The two Talbot County wastewater treatment plants, located in Tilghman and St. Michaels, are respectively rated at 150,000 and 660,000 gallons/day.

The annual cost/household for use of the County's wastewater facilities is \$600 in Sanitary District 1 (Unionville, Tunis Mills and Copperville), \$600 in Sanitary District 2 (St. Michaels, Rio Vista, Royal Oak, Newcomb and Bellevue) and \$380 in Sanitary District 5 (Tilghman). The variances in these costs, which are reviewed annually, are due to differences in types of collection systems and capital debt shares. During the 2012 legislative session, the Bay Restoration Fund fee was increased by \$30 per year. This increase will be reflected in future sewer service bills.

One-time fees for new services are assessed at \$10,000 - \$12,000 per equivalent dwelling unit for Unionville, Tunis Mills, Copperville, St. Michaels and Rio Vista, Royal Oak, Newcomb and Bellevue and \$1,490 for Tilghman. These fees are for capital replacement and repair and system expansion costs. There may be additional charges for new service for retroactive capital debt share costs, which vary according to the service area.

For further information, or service inquiries, please contact the following:

Talbot County Environmental Operations 410 745-9257
Division:

Talbot County Environmental Health Office: 410 770-6880

Page last modified 02/15/18 14:33:01

ABOUT TALBOT COUNTY

Talbot County is located in the heart of Maryland's Eastern Shore. Founded around 1661, it's named for Lady Grace Talbot, sister of Lord Baltimore and the first proprietary governor of Maryland.

Today, the county is home to the charming towns of Easton, Oxford, Queen Anne, St. Michaels and Trappe. With more than 600 miles of shoreline, Talbot County is a terrific place to live, work and play.

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CONTACT INFORMATION

Talbot County Courthouse
11 North Washington St.
Easton, MD 21601

Contact List

webmaster@talbotcountymd.gov

Time Clock

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Alternative 5

STE and STEP System

Updated Annual O&M

Expense Item	Description	Annual Amount
Contract Waste Treatment	Wastewater treatment charges	100,000
Insurance	Insurance	3,000
Supplies	Parts, controls, floats, and maintenance materials	25,000
Repairs/Maintenance	STEP pump maintenance, inspections, and field service	70,000
Other	Miscellaneous operating expenses	7,000
Utilities	County side electrical costs	5,000
Contract Services, Other	Septic tanks pump out and solids removal	15,000
Salaries/Benefits	Operations staff time, inspections, and service response	110,000
Administrative/Office	Billing, records, and management	12,000
Residential Electric Cost	Homeowner electrical use for 104 STEP units	18,000

Total Annual O&M: 365,000

O&M Cost Notes

Annual operations and maintenance (O&M) costs for the recommended Alternative 5, STE & STEP System, were developed by evaluating the anticipated increase in operational requirements associated with extending sewer service to the project area. The estimated costs reflect the additional maintenance, administrative, and operational activities required to serve 104 existing connections, with infrastructure sized to accommodate a total buildout of 124 lots, including 20 undeveloped parcels reserved for future connections.

The O&M estimates represent the incremental costs associated with the proposed sewer extension only and do not include any existing operating costs associated with the Tilghman District wastewater system. These values should therefore be considered additional annual costs attributable to the project rather than the total operating cost of the existing system.

Operational costs include routine system monitoring, septic tank pumping and maintenance of STEP equipment, collection system maintenance, administrative overhead, supplies and equipment, insurance, and utility costs associated with system operation. Because the STEP configuration utilizes individual pump systems located at each residence, centralized pumping infrastructure is not required, which reduces County maintenance responsibilities compared to alternatives that require centralized pump stations.

An additional consideration not included in the County O&M budget is the electrical cost borne by individual homeowners to operate the STEP pumps. Based on manufacturer guidance and experience with similar systems, electrical consumption is estimated at approximately 15 per home per year. For the 104 currently occupied residences, this represents an estimated total homeowner electricity cost of approximately 1,560 per year, increasing to approximately 1,860 per year at full buildout of 124 connections.

These homeowner electricity costs are not included in the County's operating budget but are noted here to provide a holistic understanding of the total operating costs associated with the recommended alternative.

Proposed Project - Wastewater - Debt Repayments

Does the potential applicant have any Existing Debt with Terms?					✓Yes			
Annual Operating Budget - Debt Repayments								
Type of Loan	Owed to	Purpose	Terms(yrs)	Date of First Payment	Annual Payment	Annual Reserve	Interest Rate	Due Date
Existing Other Loan	Farmers Home Administration Bond	Royal Oak, Newcomb Wastewater System	30	06/15/2004	\$31,479.00	\$31,479.00	5.25%	03/15/2024
Existing Other Loan	Farmers Home Administration Bond	Unionville/ Tunis Mills/ Coppe rville Wastewater System	30	08/15/2000	\$7,365.00	\$7,365.00	4.50%	05/15/2030
Existing Other Loan	Water Quality Bonds	WQ Bonds of 2006	20	02/15/2008	\$517,967.00	\$517,967.00	.40%	11/15/2027
Existing Other Loan	Consolidate d Public Improvement Bond	St. Michaels Wastewater System	30	10/25/2019	\$35,613.00	\$35,613.00	2.12%	07/25/2049
Existing Other Loan	Consolidate d Public Improvement Bonds	Martingham Pump Station and Force Main	30	03/15/2017	\$73,353.00	\$73,353.00	1.38%	12/15/2046
Existing Other Loan	Consolidate d Public Improvement Bonds of 2016	Bio-Solids Facility	30	03/15/2017	\$170,203.00	\$170,203.00	1.38%	12/15/2046
Existing Other Loan	Consolidate d Public Improvement Bonds of 2018	Bio-Solids Facility	30	11/16/2018	\$46,553.00	\$46,553.00	2.21%	11/16/2047
Existing Other Loan	Consolidate d Public Improvement Bond	St. Michaels Wastewater System	30	04/23/2021	\$2,256.00	\$2,256.00	1.38%	04/23/2050
6 - 5								

Debt Service

The debt outlined is specific to the Talbot County Sanitary District. Each sewer region is financially supported through the Sanitary District Enterprise Fund which operates independently of the other enterprise funds for County operations. The total debt obligations for the county as a whole are not outlined. Tilghman District (Region V) is responsible for a proportional debt burden of \$30,000 per year.

Long-Term Debt

TALBOT COUNTY, MARYLAND

Notes to Financial Statements

June 30, 2020

6. LONG-TERM DEBT (continued)

	<u>Balance at June 30, 2019</u>	<u>Additions</u>	<u>Reductions</u>	<u>Balance at June 30, 2020</u>	<u>Amount Due in One Year</u>
Business-type Activities (continued):					
Sanitary District					
Water Quality Bonds of 2006; Total authorized borrowing of \$10,212,981; \$9,975,333 borrowed to date, loan to be repaid in level principal and interest payments over 20 years beginning February 2008; interest at 0.4%.	\$ 3,945,642	\$ -	\$ 515,634	\$ 3,430,008	\$ 517,697
Farmers Home Administration Bond; Royal Oak, Newcomb Wastewater System; original issue \$571,000, payable quarterly in payments of \$9,479 through March 2024, including interest at 5.25%.	144,545	-	32,708	111,837	31,479
Farmers Home Administration Bond; Unionville/Tunis Mills/Copperville Wastewater System Bond of 2001; original issue \$186,000, payable quarterly in payments of \$2,833 through May 2030, including interest at 4.5%.	97,836	-	7,043	90,793	7,365
St. Michaels Wastewater System Consolidated Public Improvement Bond of 2019; original issue \$1,452,000, payable quarterly in principal payments ranging from \$8,631 to \$16,329 through July 25, 2049; interest payable quarterly at 2.125%.	-	1,452,000	26,115	1,425,885	35,613
Martingham Pump Station and Force Main Consolidated Public Improvement Bonds of 2016; original issue \$2,575,000, payable quarterly in payments of \$26,240 through December 15, 2046, including interest at 1.375%.	2,398,351	-	72,265	2,326,086	73,353
Bio-Solids Facility Consolidated Public Improvement Bonds of 2016; original issue \$5,975,000, payable quarterly in payments of \$60,886 through December 15, 2046, including interest at 1.375%.	5,553,169	-	167,679	5,385,490	170,203
Bio-Solids Facility Consolidated Public Improvement Bonds of 2018; original issue \$1,786,000, payable quarterly in payments of \$80,598 through November 16, 2047, including interest at 1.375% to 2.215%.	1,719,001	-	45,572	1,673,429	46,553
St. Michaels Wastewater System Consolidated Public Improvement Bond of 2020; original issue \$222,000 payable quarterly in principal payments ranging from \$1,499 to \$2,256 through April 23, 2050; interest payable quarterly at 1.375%.	-	222,000	222,000	-	-
Total Sanitary District	<u>\$13,858,544</u>	<u>\$1,674,000</u>	<u>\$1,089,016</u>	<u>\$14,443,528</u>	<u>\$ 882,263</u>

Enterprise Fund

TALBOT COUNTY, MARYLAND

**SCHEDULE OF REVENUES AND EXPENSES
BUDGET AND ACTUAL
ENTERPRISE FUND – SANITARY DISTRICT
For the Year Ended June 30, 2020**

	St. Michaels District			Royal Oak District			Tilghman District		
	Revised Final Budget	Actual	Variance with Final Budget	Revised Final Budget	Actual	Variance with Final Budget	Revised Final Budget	Actual	Variance with Final Budget
OPERATING REVENUES									
Sewer service charges	\$ 1,112,000	\$ 1,114,805	\$ 2,805	\$ 268,850	\$ 276,780	\$ 7,930	\$ 312,900	\$ 310,867	\$ (2,033)
Sewer connection charges	480,000	257,238	(222,762)	144,000	12,000	(132,000)	7,450	1,490	(5,960)
Residential benefit charges	-	-	-	-	-	-	15,300	14,908	(392)
Wind/solar renewable energy	-	-	-	-	-	-	-	-	-
State and federal grants	-	-	-	-	-	-	-	-	-
Miscellaneous	31,500	227,019	195,519	1,000	2,067	13,487	1,000	2,091	1,091
Total operating revenues	1,623,500	1,599,062	(24,438)	413,850	290,847	(110,583)	336,650	329,356	(7,294)
OPERATING EXPENSES									
Salaries and related expenses	480,694	464,951	(15,743)	115,045	108,155	(6,890)	166,720	150,256	(16,464)
Professional fees	500	-	(500)	500	-	(500)	500	-	(500)
Office	11,750	12,025	275	7,450	5,261	(2,189)	7,800	9,390	1,590
Insurance	12,000	8,398	(3,602)	1,000	687	(313)	3,500	1,188	(2,312)
Contracted services	151,000	201,787	50,787	45,000	65,409	20,409	25,000	63,592	38,592
Repairs and maintenance	146,906	53,577	(93,329)	64,255	65,482	1,227	71,930	68,476	(3,454)
Utilities	192,900	154,137	(38,763)	50,250	39,472	(10,778)	20,500	20,473	(27)
Supplies and equipment	66,500	60,057	(6,443)	22,100	19,748	(2,352)	37,600	25,297	(12,303)
Other operating	46,750	12,925	(33,825)	3,750	3,188	(562)	4,100	3,790	(310)
Total operating expenses	1,109,000	967,857	(141,143)	309,350	307,402	(1,948)	337,650	342,462	4,812
Operating income (loss) before depreciation	514,500	631,205	116,705	104,500	(16,555)	(121,055)	(1,000)	(13,106)	(12,106)
Depreciation	-	911,588	911,588	-	150,003	150,003	-	159,058	159,058
Net operating income (loss)	514,500	(280,383)	(794,883)	104,500	(166,558)	(271,058)	(1,000)	(172,164)	(171,164)
NON-OPERATING REVENUES (EXPENSES)									
Intergovernmental revenues	-	1,190,543	1,190,543	-	-	-	-	-	-
Interest income	500	-	(500)	500	11,420	10,920	1,000	6,381	5,381
Interest expense	(59,000)	(41,490)	-	(13,000)	(6,876)	6,124	-	-	-
Net non-operating revenues (expenses)	(58,500)	1,149,053	1,190,043	(12,500)	4,544	17,044	1,000	6,381	5,381
Change in net position	456,000	868,670	412,670	92,000	(162,014)	(254,014)	-	(165,783)	(165,783)
OTHER BUDGETED EXPENSE									
Debt service	456,000	-	(456,000)	92,000	-	(92,000)	-	-	-
Capital outlay	-	-	-	-	-	-	-	-	-
Total other budgeted expenses	456,000	-	(456,000)	92,000	-	(92,000)	-	-	-
Budgeted net income (loss)	\$ -	\$ 868,670	\$ 868,670	\$ -	\$ (162,014)	\$ (162,014)	\$ -	\$ (165,783)	\$ (165,783)

Debt Service

TALBOT COUNTY, MARYLAND

Notes to Financial Statements

June 30, 2020

6. LONG-TERM DEBT (continued)

Other Obligations (continued)

A summary of debt service requirements to maturity (excluding compensated absences and capital lease payments) by years is approximately as follows:

Primary Government	Bonds			Notes from Direct Borrowing and Direct Placement		
	Principal	Interest	Total	Principal	Interest	Total
Governmental Activities						
Fiscal year Ending June 30,						
2021	\$ 2,396,743	\$ 854,060	\$ 3,250,803	\$ 896,409	\$ 89,126	\$ 985,535
2022	3,153,227	1,138,541	4,291,768	925,166	60,368	985,534
2023	2,429,400	1,043,139	3,472,539	954,864	30,670	985,534
2024	2,514,109	950,822	3,464,931	17,719	-	17,719
2025	2,457,253	842,473	3,299,726	17,719	-	17,719
2026-2030	9,055,784	2,907,166	11,962,950	8,618	-	8,619
2031-2035	6,349,281	1,456,265	7,805,546	-	-	-
2036-2040	6,790,000	504,700	7,294,700	-	-	-
Thereafter	1,440,000	15,300	1,455,300	-	-	-
Total Governmental Activities	\$ 36,585,797	\$ 9,712,466	\$ 46,298,263	\$ 2,820,495	\$ 180,164	\$ 3,000,660
Enterprise Fund - Recreation Facilities (excluding capital leases)						
Fiscal year Ending June 30,						
2021	\$ 221,185	\$ 25,262	\$ 246,447	\$ -	\$ -	\$ -
2022	227,278	19,866	247,144	-	-	-
2023	155,000	14,300	169,300	-	-	-
2024	160,000	11,375	171,375	-	-	-
2025	145,000	7,250	152,250	-	-	-
2026-2030	145,000	7,250	152,250	-	-	-
Total Recreation Facilities	\$ 1,053,463	\$ 85,303	\$ 1,138,766	\$ -	\$ -	\$ -
Enterprise Fund - Sanitary District						
Fiscal year Ending June 30,						
2021	\$ -	\$ -	\$ -	\$ 880,107	\$ 190,421	\$ 1,070,528
2022	-	-	-	889,207	181,717	1,070,924
2023	-	-	-	896,759	175,129	1,071,888
2024	-	-	-	895,749	174,885	1,070,634
2025	-	-	-	861,099	154,928	1,016,027
2026-2030	-	-	-	2,690,957	662,641	3,353,598
2031-2035	-	-	-	1,959,366	505,554	2,464,920
2036-2040	-	-	-	2,116,976	347,944	2,464,920
2041 - 2045	-	-	-	2,288,207	176,713	2,464,920
2046- 2050	-	-	-	965,101	24,012	989,113
Total Sanitary District	\$ -	\$ -	\$ -	\$ 14,443,528	\$ 2,593,944	\$ 17,037,472

Annual Operating Budget – Short Lived Asset Reserves

Description	Replacement Cost	Useful Life	Annual Reserve
New STEP Pumps (104 units)	2,080,000	11–15 yrs	167,000
Caps, Cleanouts, Lids	60,000	11–15 yrs	4,500
Control Floats (STEP Tanks)	42,000	6–10 yrs	5,250
Existing PS Pumps	190,000	11–15 yrs	12,700
Existing PS Control Floats	24,000	6–10 yrs	2,400
Existing STEP / Grinder Pumps	290,000	11–15 yrs	19,300
Lagoon Aeration	38,000	11–15 yrs	2,500
WWTP Pumps	128,000	11–15 yrs	8,500
WWTP Pumps	65,000	11–15 yrs	4,300
Influent Meter	12,000	6–10 yrs	1,200
Effluent Meter	16,500	6–10 yrs	1,650

Totals

Total Replacement Cost:

2,945,500

Total Annual Reserve:

229,300

Short Lived Asset Reserves

The Short Lived Asset Reserve (SLAR) reflects replacement costs for mechanical and electrical equipment associated with the recommended STEP system and existing Region V wastewater treatment infrastructure. The reserve values represent estimated annual funding levels necessary to replace equipment at the end of its expected service life.

Because the recommended Alternative 5 does not require a centralized pump station, pump station meters, duplex pumps, and associated control floats were removed from the reserve schedule. The largest addition to the reserve schedule reflects the installation of individual STEP pump systems serving the 104 occupied residences within the project area.

The SLAR values are planning-level estimates intended to support long-term financial planning for equipment replacement and may be refined during final design and system implementation.

Total Cost**Project Type: Wastewater**

Category	Cost
Non-Construction Total	1,975,000
Construction Total	4,356,000
Total Cost for Project Type	6,331,000

Grand Total

Category	Cost
Grand Total All Types	6,331,000

- **Non-Construction Total: 1,975,000**
- **Construction Total: 4,356,000**
- **Total Cost for Project Type: 6,331,000**
- **Grand Total All Types: 6,331,000**

Summary of Recommendations

After the evaluation of the five alternatives outlined in this PER, the clear answer terms of both economic sense and ease of use is the STE/STEP system sewer extension. This system will retire existing septic systems and tie Fairbank and Bar Neck into the Region V wastewater collection and treatment system. This will help the county address the poor draining soils, failing septic, and provide for future growth. Furthermore, the sewer extension will provide the County the infrastructure to address TN and TP reduction when the wastewater treatment plant upgrade for Region V, expected to be completed prior to 2030, is undertaken. The County has made aggressive goals for septic system upgrade and retirement in recent years and this project is within the scope and recommendations outlined in both the County Water and Sewer Plan and the Water Resource Element for the County.



Preliminary Evaluation of an **Orenco® Prelos Sewer™ System**

Project Name

Fairbank and Bar Neck Sewer Extension

Prepared for

James Cook
Rauch Inc.

Prepared by

Stephenie Wright
Systems Engineer

Date

February 19, 2021

Prelos™ The Next Step In
Sewer Evolution



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Our Project Understanding

Orengo has been asked to evaluate Fairbank and Bar Neck, located in Tilghman, MD. The project consists of 110 lots. At this time, 105 of the properties are occupied and all of the properties are zoned for residential use.

The topography of the project area is generally described as flat, with a minimum elevation of 2 feet and a maximum elevation of 8 feet with high groundwater. The soils are generally assumed to be poor and rock is not an issue.

There is existing wastewater collection infrastructure in proximity to the project area. The closest point of connection is approximately 10,000 ft away. Connection would be made to an existing manhole in the Tilghman Island service area. Wastewater treatment will be provided by an existing wastewater treatment facility.

The collection system to service this project would require approximately 18,500 linear feet of pressurized collection main.

A summary of design information and parameters is shown in Appendix 1.

A map of the project area is shown in Figure 1

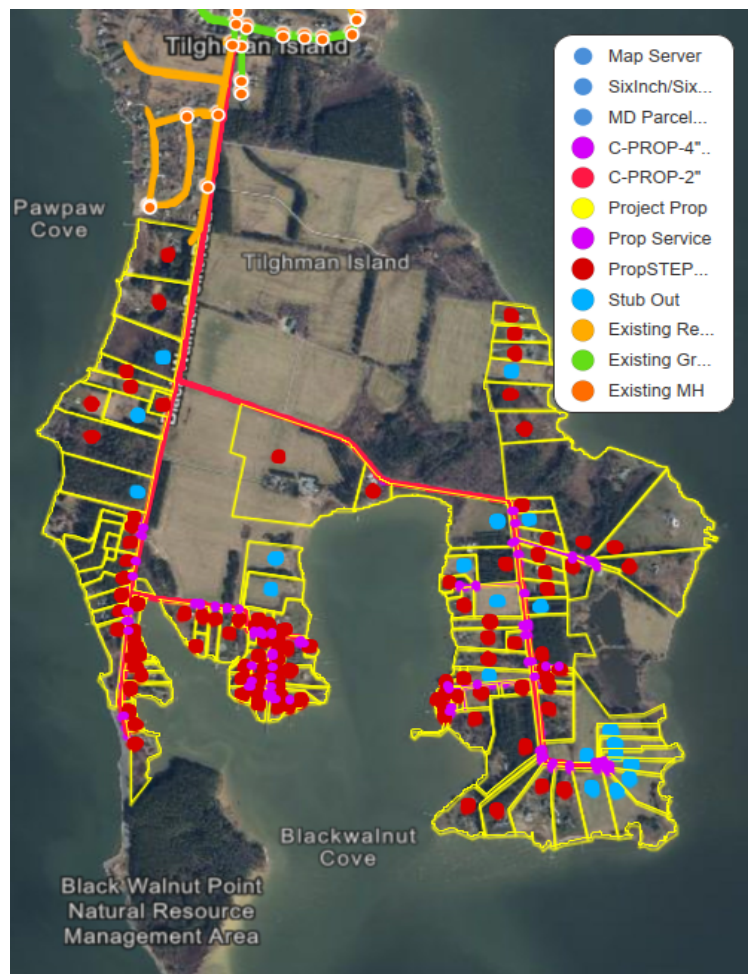


Figure 1. Fairbank and Bar Neck Service Area

About Orenco®

Since 1981, Orenco's® mission has been "Protecting the World's Water." We're privileged to design and manufacture products that help ensure the health and safety of people, neighborhoods, and communities, everywhere.

Orenco was founded in response to widespread failures in Oregon's onsite wastewater systems. Since then, we've grown to become an industry leader, with hundreds of employees and more than 300 points of distribution in North America, Australasia, Europe, Africa, and Southwest Asia. You can find our products and solutions in 70 countries, on virtually every continent.

Protecting the world's water resources is the overarching goal in all we do, from product development and manufacturing to customer service and technical support. The same sense of purpose still drives us. Every. Single. Day.

About Prelos™

A wastewater collection system is generally defined as a system of gravity pipes, manholes, tanks, lift stations, control structures, and force mains that gather used water from residential and nonresidential customers and convey that waste to a wastewater treatment plant for final cleaning and discharge. Orenco's Prelos Sewer™ is an innovative technology based on 40 years of proven sewer solutions. Prelos Sewer is an efficient, sustainable, and adaptable modern-day sewer system. It provides primary treatment at the source and conveys partially treated water through shallow-bury, small-diameter pressure pipes to a wastewater treatment plant for final cleaning and discharge. Prelos Sewer is not a gravity system and does not have manholes or lift stations.

The Prelos Processor™ (Figure 2) is the core of a Prelos Sewer. The Processor provides complete, integrated storage, filtration, and pumping of wastewater for the on-lot portions of Prelos Sewer. The Processor stores and passively treats solid waste, providing primary treatment for the treatment plant. Meanwhile, the pump vault filters solids, allowing the system to only pump effluent, which drastically reduces the size and magnitude of the wastewater collection mains.

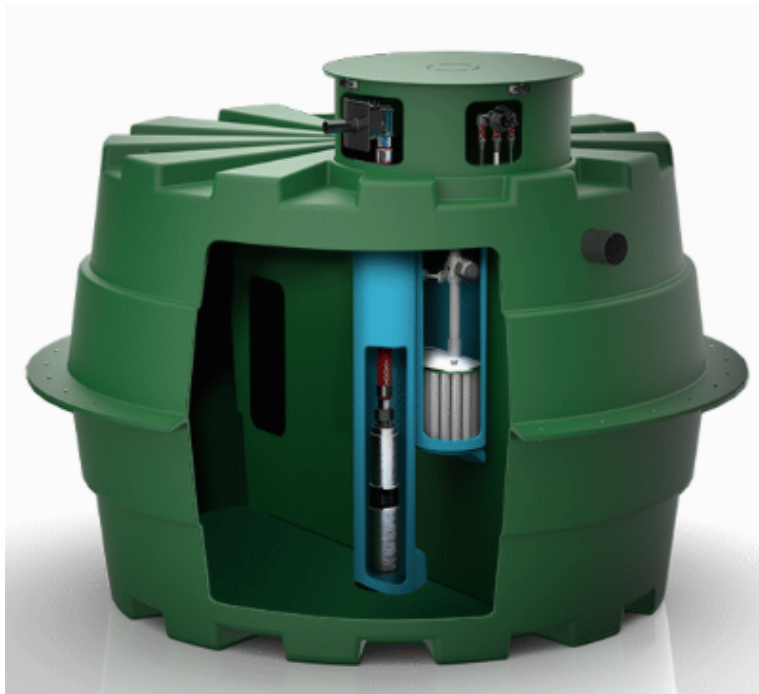


Figure 2. Typical Prelos Processor™

The Prelos Processor is a complete package, reducing installation errors and on-lot installation costs. It includes a DCPD (dicyclopentadiene) meander tank, ClickTight™ electrical connection system, control panel, hanging pump assembly, passive self-cleaning Biotube® filter, and turbine effluent pump.

Each Prelos Processor comes with a standard 5-year warranty on the Processor itself, with an extended 10-year warranty on the turbine pump. Processors are available in 1000-gallon and 1500-gallon capacities. A 1000-gallon system is typically adequate for homes up to and including 4 bedrooms. Larger homes will require a 1500-gallon tank.

The collection system typically consists of shallow-bury, 2- to 4-inch collection mains located adjacent to the right-of-way. Mains are gradually upsized relative to the flows they convey. Installation can be completed by directional boring or in narrow trenches.

Without solids to worry about, mains can often be sized for ultimate build-out or for extreme pumping distances, because minimum flow velocities do not dictate minimum line sizing. Furthermore, collection systems can generally be sized to avoid lift stations or pumping stations. Figure 3 shows a typical Prelos wastewater collection main with Prelos Processor connections.



Figure 3. Typical Prelos Sewer System

Why Prelos?

As stated previously, Prelos Sewer is a modern-day sewer, significantly different than traditional methods of wastewater collection.. When planning and constructing a Prelos Sewer, it's critically important to understand what makes Prelos Sewer different and how these differences can be optimized. For this specific project, we believe a Prelos Sewer can provide the following benefits:

Reduced Water Quality Impact

Wastewater effluent is one of the largest contributors of nutrient enrichment entering bodies of water, resulting in a decline in water quality. Conventional septic systems do not remove much nitrogen or phosphorus from the waste stream without pretreatment, resulting in nutrient-rich effluent entering ground- or surface water. Prelos Sewers are designed with watertight collection lines to convey this effluent from individual lots to centralized wastewater treatment plants capable of enhanced nutrient removal. In the event the treatment plant or collection main is temporarily offline reserve volume within the Prelos Processer minimizes discharge of untreated effluent.

Resiliency to Climate Change

Climate change has had a profound impact on existing wastewater collection systems. In coastal areas, sea level rise is causing elevated groundwater levels and increased incidence of tidal flooding. Climate change is causing changes in precipitation patters and has increased the severity of storm events like hurricanes. Resilient infrastructure is infrastructure that can withstand the impacts of climate change while retaining its structure and function.

Prelos Processors are typically installed in close proximity to a home. This places the Processor away from the flooding that can normally occur within the public right-of-way. Access to the Prelos Processor can be maintained when other systems located within the right-of-way become flooded. Prelos Sewer Systems are designed to be watertight. This keeps extraneous water out and wastewater in.

After a major storm event, the Prelos Processor can be powered up with a basic off-the-shelf, hand-held generator, as it only requires single-phase, 120v power. With a generator, wastewater can be pumped directly to the wastewater treatment plant, without the need for repumping facilities that could be compromised by a storm.

The Prelos Processor has at least 200 gallons of reserve capacity, which is enough reserve capacity to last at least one day of normal use and several days of reduced use.

Rapidity is also an important aspect of resiliency. Rapidity defines the ability of the system to recover after an undesired event. The Prelos collection mains will remain unaffected by most events. If, for some reason, a Prelos Processor is rendered inoperable, it will only impact a single customer, not the complete system. Tanks can be pumped down completely to provide longer-term temporary capacity and in the worst-case scenario, a system can promptly be replaced. Since the system is pressurized, in the event a treatment plant or collection main is damaged, the system is capable of being connected directly to a tanker truck for hauling.

Long Conveyance Distances without Lift Stations

Wastewater typically requires a flow velocity of 2 ft/second to create enough scouring velocity to keep pressure mains clean. Prelos Sewers retains solids at the source, reducing the need for scouring velocity. Without the constraints of flow velocity, pipes can be liberally oversized to extend pumping distances. Combined with the extremely high shut-off head of the Prelos turbine pump, exceptionally long pumping distances can be achieved without the need for any intermediate lift stations.

Low-Impact Construction

The installation of 2" Prelos collection mains can be completed without trenching by using directional boring, reducing the construction impact to only entry and exit pits. If open trenching is utilized, a trencher or narrow excavation bucket can be used to minimize construction impact. Typically, construction can largely be completed without road closures, maintaining access to existing homes and businesses.

Reduced Initial Capital Cost

A Prelos Sewer is predominantly 2-6" low-pressure pipe typically located within the public right-of-way. Similar to a water main, pipe can be run solely down the streets that are to be serviced and can be extended to future service areas as the need arises. Since the pipes are typically located within the green area of the right-of-way and can easily be installed with trenchless technology, expensive restoration of existing roadways or infrastructure can be completely avoided.

The bulk of gravity sewer construction must occur before connections can be made. Additionally, the cost burden of connecting to the system is often not included in the project cost. Larger initial capital costs translate to more initial cost per customer served and more financing requirements.

By comparison, the Prelos Processors can be omitted from the initial capital cost, as a Processor is not necessary until a home is actually connected to the system. The initial capital cost to make Prelos Sewer available for connection is normally a fraction of the cost to make gravity sewer available.ⁱ

Manageable and Sustainable O&M Cost

Operation and maintenance (O&M) costs for gravity sewer systems are generally defined by the length of pipe and the number of lift stations. Additionally, gravity sewer O&M requires very expensive and large equipment. For this application, each service area would require at least one lift station and an associated gravity sewer collection system. This infrastructure, while very expensive to operate, would have a very limited number of customers sharing in the cost of operation.

By comparison, Prelos Sewer has very few O&M costs associated with the collection mains. Virtually all O&M costs are associated with the Prelos Processor unit. Since each Prelos Processor is not installed until there's a revenue generating customer, O&M expenses are always closely aligned with expenses, regardless of the number of properties actually connected. Long-term R&R is generally included in the O&M cost, since any equipment failures need to be repaired immediately. Maintaining a Prelos Processor only requires basic tools and a small utility vehicle.

Low Energy Demand

Pumping wastewater without solids is more efficient than pumping solids with water. A typical Prelos pump will consume approximately 100 kilowatt-hours per year. This is less than the cost of operating a 60-watt bulb for a year.

Scope of Supply

Orenco manufactures and ships Prelos Processors as complete units, ready for installation at each property. As mentioned previously, each Processor unit includes the tank, pump vault, riser, lid, Biotube® filter, high-head turbine effluent pump, and control panel. Options that must be evaluated and determined during the design phase include the following:

Riser Height

FRP risers are installed on top of the Processor to extend tank access up to finished grade. The riser also includes the hanging discharge assembly, ClickTight™ wiring connection system, and lid fastening hardware. Typically, the invert elevation for the tank inlet is located 10 inches below the top of the tank. The riser height will define the inlet depth. For example, a 24" riser will yield a 34" inlet depth. The riser height can be standardized or the risers can be field cut, depending on the installation preference. If the riser height is standardized, the hanging pump assembly, ClickTight™, and lid fasteners can be factory installed.

Tank

As stated above, DCPD Prelos tanks are available in 1000-gallon and 1500-gallon sizes. A 1000-gallon tank is adequate for up to a 4-bedroom home, unless state regulations require otherwise. Likewise, a 1500-gallon

Prelos tank will be adequate for 5- and 6-bedroom homes, unless regulations require otherwise. Contact Orenco to determine tank sizing for larger homes or for commercial applications.

Control Panel

The standard electrical control panel provided with a Prelos Processor is an Orenco Simplex Panel, Model #S1HR. The panel enclosure is UV-resistant fiberglass, UL Type 4X with stainless steel hinges. This panel includes audible and visible high-level alarms, with a “push to silence” button for the audible alarm. The high-level alarm has a redundant high-on relay that will turn on the pump in the event that the pump-on control float has failed. The wire landing strip is color-coded to match the incoming wire colors from the ClickTight™ connector. The most typical option to include would be a generator receptacle with a manual transfer switch, and other options are available.

Pumps

One pump, the Orenco PF-Series 4-in. 10 gpm pump, is used for all residential Prelos connections with pumping capabilities greater than 200 ft TDH. These pumps are field serviceable with common tools and have a minimum 24-hour run-dry capability (while submerged in liquid) with no deterioration in pump life or performance. The pump is equipped with Type S00W 600-V ClickTight™ power cords that are suitable for Class 1, Division 1 and 2 applications. Larger pumps are available for commercial and other large-flow applications. Figure 4 shows the pump curve for the PF Series 10 gpm pump.

Generally, all piping, valving, and associated appurtenances for the collection mains are supplied by other vendors.

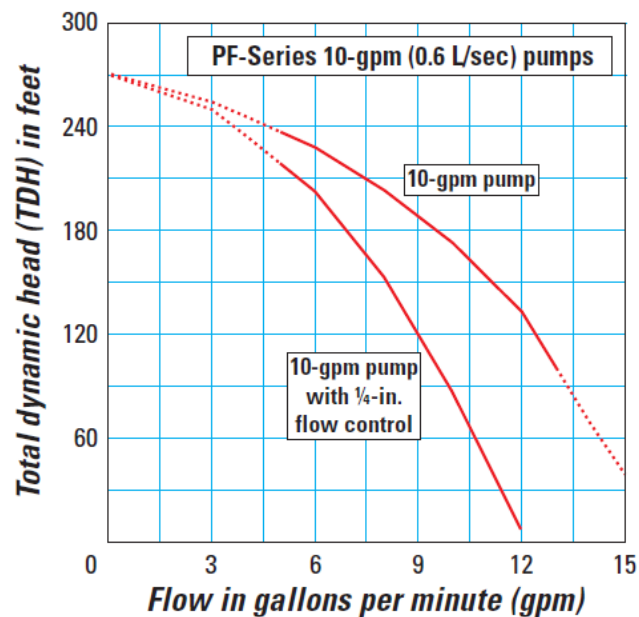


Figure 4. Typical Prelos Pump Curve

Project Approach

A Prelos Sewer customarily includes small-diameter, pressurized collection mains that connect a network of Prelos Processors. The Prelos Processors collect wastewater from the source, provide primary treatment, and

then convey the partially treated wastewater off-site for final treatment. The costs associated with providing a sewer system can be broken into two categories: the initial capital cost to make sewer available (availability cost) and the deferred cost to connect a property (the connection cost). Orenco recommends that the project costs be broken into these two cost categories when doing financial analysis and evaluating funding strategies.

The availability cost of a Prelos Sewer may only include the pressure mains and associated appurtenances necessary to provide service for properties. This would include all valves, air releases, and terminal-end clean-out assemblies. All mains are installed at the depths required by applicable regulations. Pipes can be PVC or HDPE, rated to withstand 150 psi.

Sewer can be made available to all properties with construction of all necessary collection mains at one time, or the mains can be installed gradually in phases that are advantageous to the economics and logistics of the project. Mains can be liberally oversized for future build-out and/or service extensions, as necessary.

The service laterals can be installed as part of the mainline construction or they can be deferred to the time of connection. When installed with the main, extra service laterals can be installed and coiled above ground so that connections can be made without additional piping. If service lateral installation is deferred to the time of connection, these laterals can be tapped onto the main, similar to a water main. Service laterals can be combined to serve two properties when it reduces capital cost.

All service laterals should include an isolation valve and check valve at the main so that the lateral can be shut off for servicing, if necessary.

Figure 5 shows the preliminary line sizing. Line sizing has been confirmed based on the preliminary sizing provided. Orenco will assist with a detailed hydraulic grade line analysis to determine actual line sizing during project design.

For septic-to-sewer projects, Prelos Processors can be installed after the mainlines are completed and activated. Most often, they are installed in the same location as the septic tank by simply removing the septic tank and installing a Prelos Processor in its place. Alternatively, if space allows, the Processor can be installed next to the existing tank so that the flow can be rerouted into the Processor, effectively reducing the impact to wastewater service. Panels will be serviced with a single-phase, 120v power supply, either with a dedicated circuit out of the existing panel or directly from the electrical meter.

Prelos Units are not required for any vacant properties or for properties not immediately connecting to the sewer system.

Prelos Processors should be ordered in quantities that facilitate full truckloads. This will mitigate any cost increases due to shipping. Generally, 10 assembled Processors will fill a truck; however, Orenco should be consulted to determine the best ordering protocol.

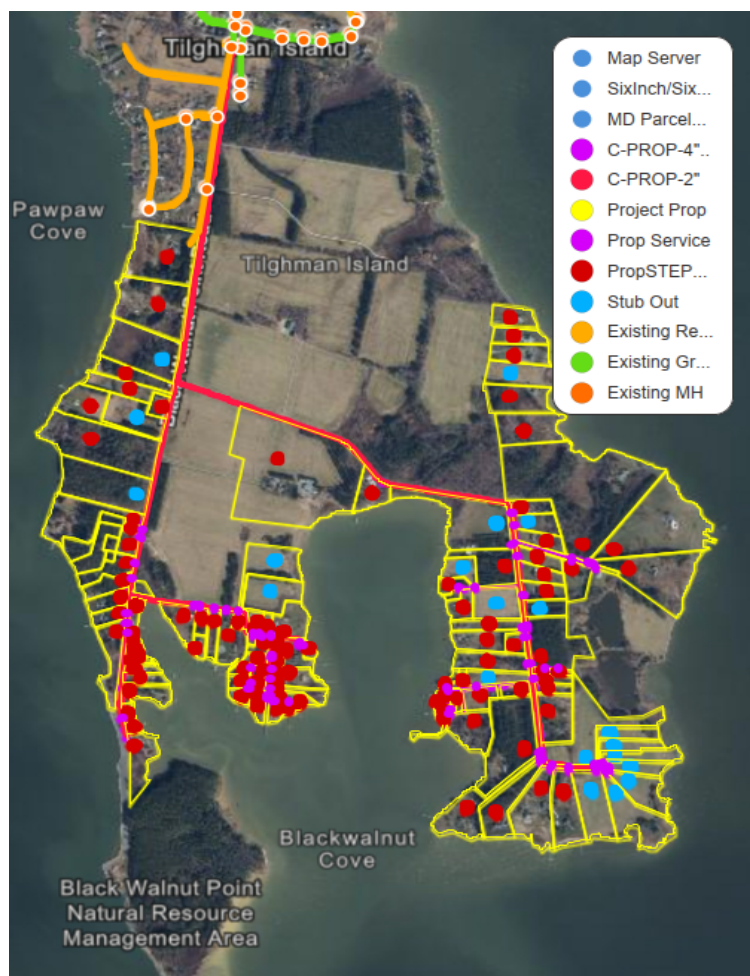


Figure 5. Preliminary Line Sizing

Commissioning & Training

Once identified, Orenco should be advised as to who the Prelos Processor installer(s) will be, as well as who the system operators will be. Orenco will provide installation training for all potential Prelos Processor installers and certify them for Processor installation once they have fulfilled the training requirements. Training may be in person or online. Furthermore, Orenco may provide onsite, spot check inspection of installs as time permits to assure that the installations are being completed in accordance with applicable standards, though the owner and engineer have primary responsibility for installation inspections.

Once installed, Orenco requires that a certified operator provide ongoing preventative and reactive maintenance for the system. Orenco will provide training and certification of the operators prior to commissioning of the system. Training may be in person or online.

Warranty

The Prelos Processor is warrantied for five (5) years against material defects or workmanship that causes the product to lose structural integrity, have an electrical failure, or to mechanically operate improperly. The Prelos pump – an Orenco® multi-stage, high-head, submersible turbine pump – will be warrantied for ten (10) years from the date of manufacture for the liquid end of the effluent pump. Limitations or exclusions may apply and will be identified at the time of sale, subject to Orenco's "Terms & Conditions." Use of any non-Prelos components during the warranty period shall render the warranty null and void.

Operations Support

After the system is placed into service, Orenco will provide ongoing operations support. This will include periodic check-ins either by phone, by email, or in person. Orenco will assist with ongoing training and troubleshooting, as need dictates. Contact names and numbers for Orenco's operational support will be provided during the operator training.

Cost of Operations and Maintenance

Operation and maintenance (O&M) of a Prelos Sewer is almost entirely focused on the Prelos Processor. There is very little O&M associated with the collection mains, other than exercising valves and servicing air release assemblies. Since a Prelos Processor is not installed until a home is built or an existing home opts to connect, O&M costs don't start until a rate-paying customer exists. This important attribute of Prelos Sewer assures that O&M costs are always closely aligned with incoming revenue.

O&M costs can be categorized as either preventative maintenance or reactive maintenance. Finding the correct balance of preventative and reactive maintenance is critical in assuring the lowest possible overall O&M cost.

Preventative maintenance is maintenance that can be planned and done proactively to keep the system running at its best. For a Prelos Sewer, preventative maintenance includes sludge and scum management, and would also include a periodic comprehensive system check. For this application, we would recommend that sludge and scum accumulation be measured every three years and that tanks be pumped in accordance with recommendations from Orenco. The tanks are sized to target 10- to 12-year pump-out intervals, on average. Comprehensive system checks would likely occur every 3-5 years. Preventative maintenance can be programmed and completed during a single site visit.

Reactive maintenance is unplanned maintenance, usually required due to unperformed preventative maintenance or equipment failure. For a properly managed Prelos Sewer, we anticipate roughly 1.5 hours per month of reactive maintenance for every 100 connections.

Additionally, maintenance will periodically require parts and materials to execute repairs. The system can be maintained with very basic tools and a small utility truck. Inventoried parts are minimal.

During the first 10 years, the Prelos Sewer will require very little maintenance and the annual costs will be very low. We do suggest that preventative maintenance be conducted during this period on the prescribed schedule.

After 10 years, as the system matures, we anticipate an annual O&M cost in the range of \$100 (US funds) annually per connection, based on historical data. Figure 6 shows the anticipated breakdown in annual O&M costs for a mature system.

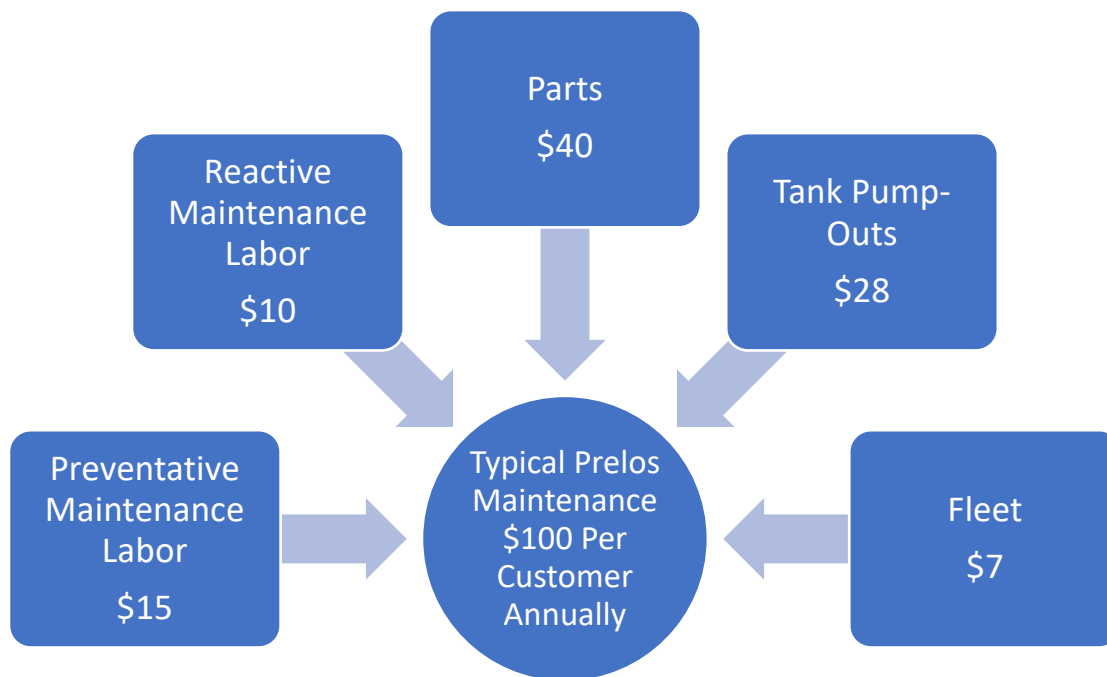


Figure 6. Typical Prelos Maintenance Costs (Mature System)

It should be noted that other pressure sewer systems – those designed to convey raw wastewater – utilize substantially larger, more expensive, less-efficient pumps. For these systems, pump replacement alone can cost more than \$2,000. The mature system cost for Prelos includes pump replacement, liquid-end replacement, or motor replacements, as necessary.

Orenco strongly advises that all O&M be done by a responsible maintenance entity. Typically, this is a public utility. However, Orenco does have successful systems being contracted to a maintenance provider. Orenco provides training, certification, and ongoing support for maintenance entities. Orenco does not believe that customer-owned and maintained systems are appropriate for community wastewater collection systems. Prescriptive easements are utilized for access to the Prelos Processors. The homeowner is responsible for the integrity of the lateral between the home and Processor.

The homeowner is also responsible for the electrical supply to operate the pump in the Prelos Processor. This cost is typically between \$10 and \$15 annually.

In addition to direct O&M costs, Prelos Sewer also offers indirect cost savings for wastewater. Prelos provides passive primary treatment that reduces the organic strength of the wastewater and separates out any inorganics. Indirect savings at the wastewater treatment plant would result from the following:

- Lower BOD₅ will reduce aeration requirements and the associated electricity demand. Lower BOD₅ and TSS will result in up to 70% lower biosolids production at treatment plant. Liquid-only sewer will not result in any additional screenings at the headworks of the treatment plant
- Prelos is designed to be watertight and not increase hydraulic flow due to I&I of extraneous water
- Peak flows from Prelos Sewer will typically be lower than peak flows from gravity sewer

Life-Cycle Costs

Comparing dissimilar wastewater options can be difficult. Life-cycle costs are often used as a method of comparison. In simple terms, dissimilar systems can be compared by determining how much money we would need today to construct, maintain, renew, and eventually replace the system over its lifetime. Figure 8 shows the typical accumulation of costs over the lifetime of a wastewater collection system.

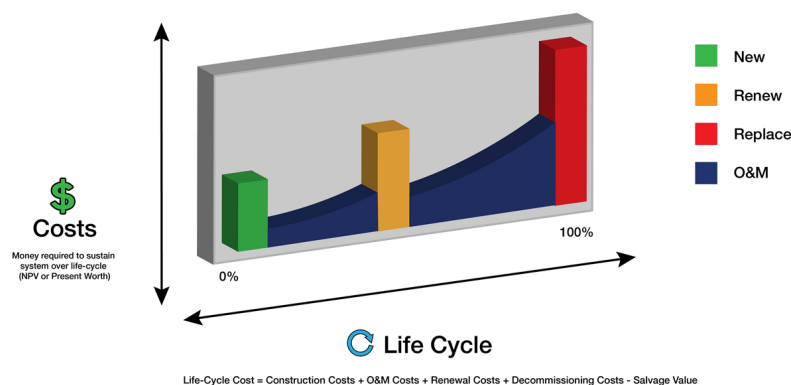


Figure 7. Typical Life Cycle for Wastewater Infrastructure

Unfortunately, life-cycle analysis is highly sensitive to the data and duration of time. Incorrect data or the omission of pertinent renewal and replacement items that are beyond the analysis period can have a profound impact on the outcome of the analysis. When evaluating Prelos in a life-cycle analysis, we recommend the following:

Item	Frequency/Anticipated Life
Prelos Tank	50 years
Effluent Pump	20 years
Control Floats (2)	10 years
Effluent Filter	20 years
Collection Mains	50 years
Tank Pump-Outs	Every 10 years, on average
Preventative Maintenance Visit	30 minutes every 3 years
Reactive Maintenance Visit	1.5 Hours/100 EDU's per year
Electrical Use (Typically paid by homeowner)	14 kWh/yr per EDU
Indirect Electricity Savings (Treatment Plant)	\$5 to \$30/yr ¹
Indirect Savings Biosolids (Treatment Plant)	\$10 to \$20/yr ¹

1. Savings will vary significantly, depending on treatment process. Electrical savings are attributed to reduction in influent BOD and biosolids at the plant will be reduced due to solids retention in the Prelos Processor.

Appendix 1 – Design Information

Design Parameter	Value
Platted Lots (#)	124
Septic to Sewer (Y/N)	Y
New Construction (Y/N)	N
Immediate Connections (#)	105
% Residential	100
Minimum Elevation	2
Maximum Elevation	8
Funding	USDA or MDE Bay Restoration
Owner	Talbot County
Operator	Talbot County Environmental Operations
Existing Infrastructure	Gravity Sewer
Point of Connection	Nearest manhole in Region V (Tilghman) wastewater collection system

ⁱ See Orenco's Vero Beach case study: <https://www.orenco.com/case-studies/vero-beach-florida>.