



PUBLIC INFORMATION MEETING

Benedict Central Sewer System

September 26, 2012

BENEDICT CENTRAL SEWER SYSTEM

PROJECT OVERVIEW

BENEDICT CENTRAL SEWER SYSTEM PROJECT OVERVIEW

- **Project Purpose:** To design and construct a centralized wastewater collection, treatment, and disposal system to replace all individual on-site septic systems with a public sewer system.
- There are an estimated 209 developable lots, of which, 123 or 58.8% are developed.
- Benedict is identified in the current 2006 Comprehensive W&S Plan as a septic tank failure area (Appendix - 4M)
- Benedict's failure designation first appeared in the 1997 Comprehensive W&S Plan as an area experiencing health problems from on-site disposal of sewage (Source: 1974 Sewerage Facilities Report by the Maryland Department of Health and Mental Hygiene)

BENEDICT CENTRAL SEWER SYSTEM PROJECT OVERVIEW

- **Most of the developed lots contain 25+ year old OSDs which predate today's more advanced techniques**
- **In the mid-80's a public water system was installed due to the contamination of wells by nitrates from septic systems. (Source: Charles County Health Dept.).**
- **Feasibility Study completed in 2004 by Wallace Montgomery & Associates (WMA) to identify and evaluate alternatives for sanitary sewerage collection, treatment, and disposal.**
- **Design began in 2009 by JMT**

BENEDICT CENTRAL SEWER SYSTEM PROJECT OVERVIEW FEASIBILITY STUDY

- **Design Flow = 81,000 gpd (Buildout of 243 lots @ 333 gpd/lot)**
- **Results/Alternatives:**
 - **Collection Systems:**
 - **Grinder Pump** **\$1,012,567**
 - **Vacuum Sewer System** **\$1,050,268**
 - **Gravity Sewer System** **\$1,153,571**
 - **Treatment and Discharge Systems:**
 - **SBR – Surface Water Discharge** **\$2,089,841**
 - **Schreiber Process/Surface Water Discharge** **\$2,177,656**
 - **Schreiber Process/Land Application** **\$4,145,531**
 - **SBR/Land Application** **\$4,427,254**

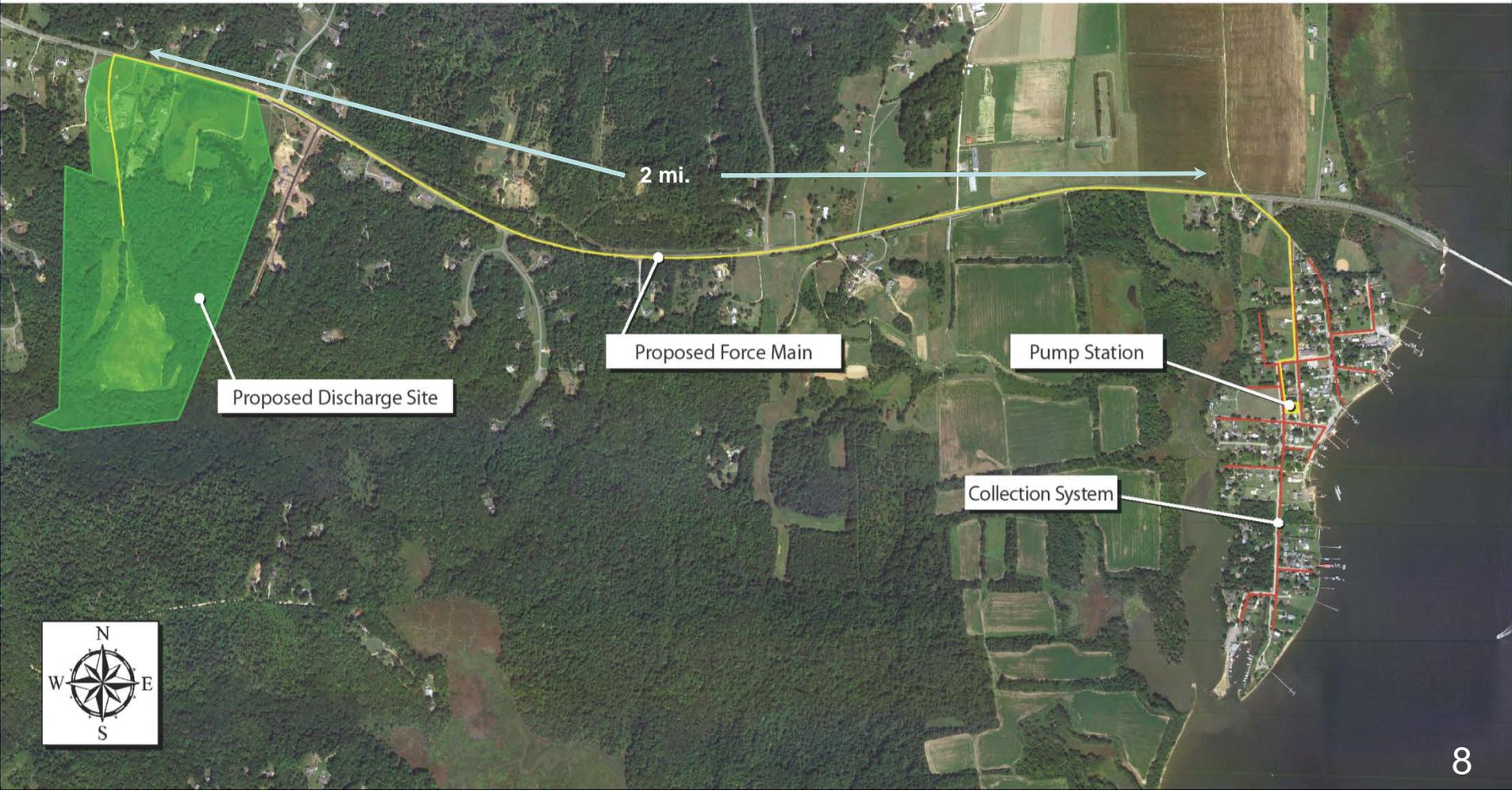
BENEDICT CENTRAL SEWER SYSTEM PROJECT OVERVIEW FEASIBILITY STUDY

- **Recommendations:**
 - **Least Cost Aggregate System**
 - **Collection: Grinder pump system**
 - **Treatment: Sequencing Batch Reactor**
 - **Disposal: Surface water discharge**
 - **Estimated Cost: \$3,102,408**
- **Estimated Construction Cost Per Capita:**
 - **\$12,800 at build-out (243 lots)**
 - **\$23,000 for existing lots only (135 lots)**

BENEDICT CENTRAL SEWER SYSTEM

TECHNICAL OVERVIEW

BENEDICT CENTRAL SEWER SYSTEM CONCEPTUAL LAYOUT



BENEDICT CENTRAL SEWER SYSTEM CONCEPTUAL LAYOUT

DISPOSAL SITE AREA

- WWTP Site
- Effluent Storage
- Discharge

- Major Design Elements:
 - Treatment Plant
 - 60-day Storage Pond
 - In-ground Piping
 - Spray Heads
 - Cover Crop

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Proposed Effluent Discharge Site



- WWTP Site
- Effluent Storage
- Discharge



BENEDICT CENTRAL SEWER SYSTEM DESIGN FLOW

Design Condition	Flow (gpd)			
	Annual Average Day Flow	Peak Hydraulic Flow ³	Inflow & Infiltration ⁴	Design Hydraulic Flow ⁵
Start-up ¹	31,510	126,040	1,600	127,640
Ultimate ²	58,863	235,452	1,600	237,052

¹Projected flow from existing development calculated based on Charles Co. Water & Sewer Ordinance + 10%

²Projected flow from existing and future development + 15% for more intense development

³Peak Hydraulic Flow = AADF x 4 (CC W&S Ordinance – MDE Design Guidelines)

⁴Inflow & Infiltration calculated based on 100 gpd/in-dia/mile of pipe (CC W&S Ordinance)

⁵Design Hydraulic Flow = Peak Hydraulic Flow + Inflow & Infiltration

BENEDICT CENTRAL SEWER SYSTEM DESIGN FLOW CALCULATION

Table I-1: Benedict Central Sewer System Design Flows

Design Condition	Flow (gpd)			
	Annual Average Day Flow (AADF)	Peak Hydraulic Flow	Infiltration & Inflow	Design Hydraulic Flow
Start-up	31,510	126,040	1,600	127,640
Ultimate	58,863	235,452	1,600	237,052

Table I-2: Estimated Start-up AADF for Benedict Community

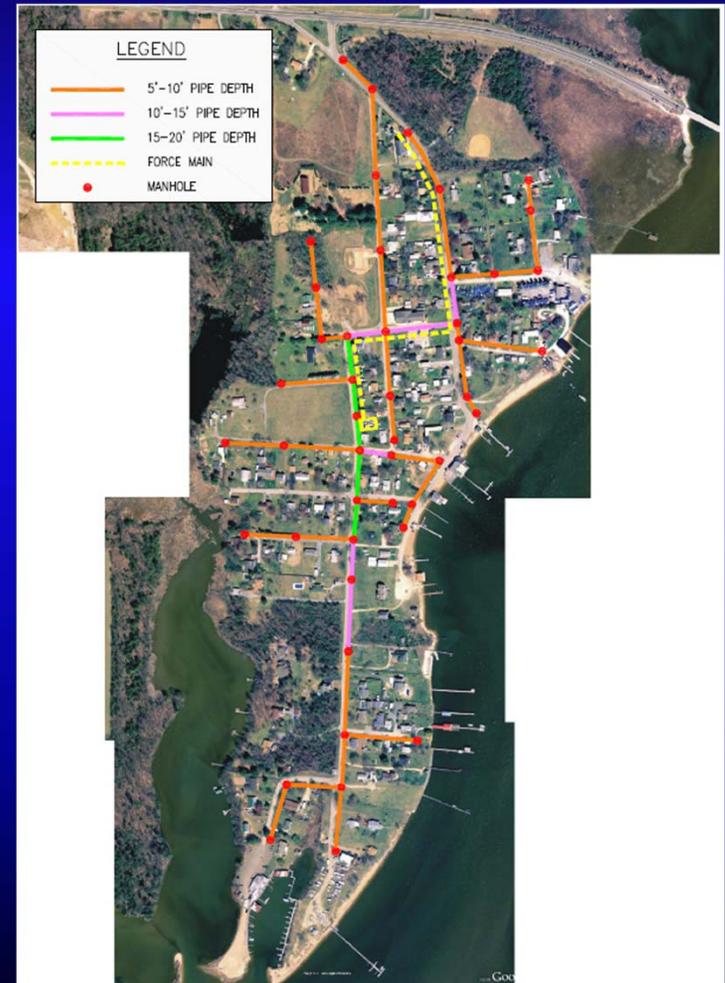
Type of Development	Customers	Flow Generation Factor	Total Flow (gpd)
Existing Residential	123	190 gpd/edu	23,370
Existing Commercial	Measured – Max Seasonal Consumption		5,275
Base Existing Flow			28,645
+10% additional development			2,865
Total			31,510

Table I-3: Estimated Ultimate AADF for Benedict Community

Type of Development	Customers	Acreage	Flow Generation Factor	Total Flow (gpd)
Base Existing Flow	Previously Calculated			28,645
Future Residential	2 EDU/Acre	43 acres	190 gpd/EDU	16,340
Future Commercial		6.2 acres	1,000 gpd/edu	6,200
Base Total Future Flow				51,185
+15% additional development				7,678
Total				58,863

BENEDICT CENTRAL SEWER SYSTEM COLLECTION SYSTEM

- **Alternatives Considered**
 - Gravity Collection System with Pump Station
 - Grinder Pump System
 - Vacuum System
- **Selected Alternative**
 - Gravity Collection System with Intermediate Pump Station
- **Design Status**
 - 75% Complete
 - Overall Project Design - 25%



BENEDICT CENTRAL SEWER SYSTEM COLLECTION SYSTEM

- **Gravity System**
 - **11,420 ft. of 8" sewer; 55 Manholes**
 - **Range of depths = 4.5 – 19.0 feet**
 - **Sewer to be installed within paved/travelled roadway**
 - **All roads to be restored to original condition**
 - **Easement requirements:**
 - **County maintained roads**
 - **Permanent Easement: None anticipated**
 - **Temporary Easement: May be required**
 - **Non County maintained roads**
 - **Permanent Easement/Agreement: Will be required for construction and maintenance (within travellway)**
 - **Temporary Easement: None anticipated**

BENEDICT CENTRAL SEWER SYSTEM COLLECTION SYSTEM

- **Key Points**
 - **Construction to be coordinated with residents**
 - **Traffic control measures to be implemented**
 - **Residents would be responsible for abandonment of on-site septic system and connection to sewer**
 - **Financial assistance may be available through MDE's Bay Restoration Fund (Contact the CC Health Department)**
 - **Excessive depths and narrow ROWs has prompted us to reconsider a low pressure grinder pump system**

BENEDICT CENTRAL SEWER SYSTEM COLLECTION SYSTEM

- **Low Pressure Grinder Pump System**
 - **Primary Benefits:**
 1. **Eliminate manholes**
 2. **3.5 - 4 feet depth**
 3. **Lower construction cost**
 - **Does increase operation and maintenance costs**
 - **Residents will own and have to maintain grinder pumps**
 - **Estimated grinder pump cost = \$5,000**
 - **Grinder pump cost may be eligible for Bay Restoration funds**

BENEDICT CENTRAL SEWER SYSTEM COLLECTION SYSTEM

- **Intermediate Pump Station**
 - **Located in the center of Benedict to limit even greater sewer depths**
 - **Land for pump station acquired by tax sale redemption on November 02, 2011**
 - **Lots 20 & 21, Block 2, Bresnahan's Subdivision**
- **Force Main**
 - **Convey waste water from the intermediate pump station to the treatment plant/disposal site**
 - **Force main route along Prince Frederick Road**
 - **Constructed within SHA's ROW**

BENEDICT CENTRAL SEWER SYSTEM TREATMENT SYSTEM

- **Alternatives Considered**
 - **Modified Ludzack-Ettinger (MLE)**
 - **Schreiber Process**
 - **Modified Oxidation Ditch**
 - **Sequencing Batch Reactor**
 - **MLE + Membrane Bioreactor**

BENEDICT CENTRAL SEWER SYSTEM TREATMENT SYSTEM DECISION MATRIX

Table IV-3: Treatment Process Alternatives Comparison

Treatment Process Alternative	Footprint	Operability	Maintenance Requirements and Costs	Treatment Reliability	Expandability
MLE + Secondary Clarifiers	<ul style="list-style-type: none"> • Large Footprint 	<ul style="list-style-type: none"> • Baseline operational requirements 	<ul style="list-style-type: none"> • Moderate process maintenance • Baseline Sludge Volume 	<ul style="list-style-type: none"> • Reliable 	<ul style="list-style-type: none"> • Difficult to expand
Schreiber	<ul style="list-style-type: none"> • Large Footprint 	<ul style="list-style-type: none"> • Increased operational requirements 	<ul style="list-style-type: none"> • Additional mechanical maintenance • Baseline sludge volume 	<ul style="list-style-type: none"> • Least reliable 	<ul style="list-style-type: none"> • Difficult to expand
Modified Oxidation Ditch	<ul style="list-style-type: none"> • Large Footprint 	<ul style="list-style-type: none"> • Baseline operational requirements 	<ul style="list-style-type: none"> • Low maintenance • Moderate power costs • Baseline sludge volume 	<ul style="list-style-type: none"> • Reliable 	<ul style="list-style-type: none"> • Difficult to expand
SBR + Cloth Filters	<ul style="list-style-type: none"> • Moderate Footprint 	<ul style="list-style-type: none"> • Limited operational requirements 	<ul style="list-style-type: none"> • Additional controls maintenance • Filter maintenance • Baseline sludge volume 	<ul style="list-style-type: none"> • Reliable 	<ul style="list-style-type: none"> • Expandable
MLE + MBR	<ul style="list-style-type: none"> • Smallest Footprint 	<ul style="list-style-type: none"> • Limited operational requirements 	<ul style="list-style-type: none"> • Increased power costs • Membrane replacement • Reduced waste sludge 	<ul style="list-style-type: none"> • Most reliable 	<ul style="list-style-type: none"> • Most easily expandable

BENEDICT CENTRAL SEWER SYSTEM TREATMENT SYSTEM

- **Selected Alternative**
 - **MLE + Membrane Bioreactor**
- **MBR benefits**
 - **No open treatment process tanks**
 - **Easily expandable provided the County with maximum flexible to meet a wide range of permit conditions**
 - **Plant effluent will be suitable for direct non-potable reuse applications**
 - **Consistent high quality effluent exceeding the world's most stringent requirements**
 - **Discreet, aesthetic architecture**
 - **Low odor and minimal sludge generation**

External Hollow Fiber



Submerged Hollow Fiber



BENEDICT CENTRAL SEWER SYSTEM EFFLEUNT DISPOSAL SYSTEM

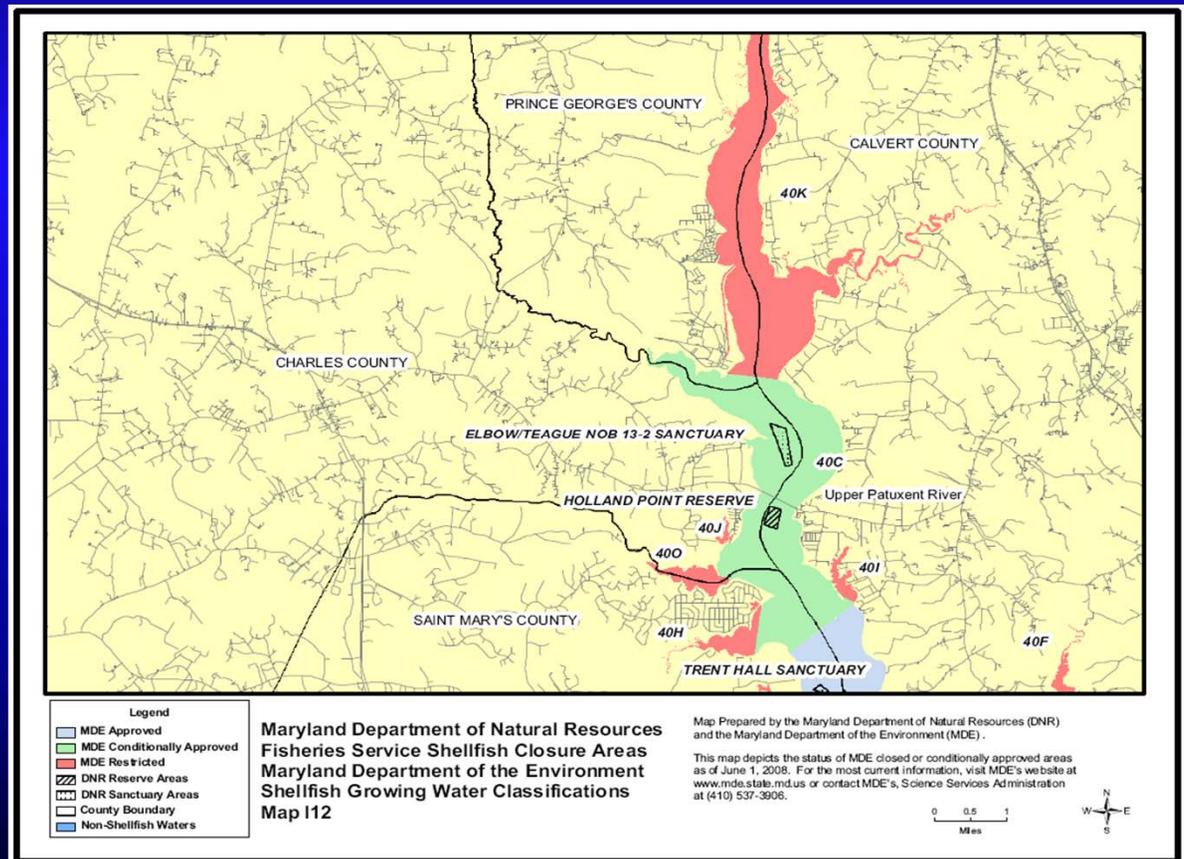
- **Alternatives Considered**
 1. **Surface Water Discharge**
(Denied by MDE - Shellfish Harvesting Designation for the Patuxent River)
 2. **Effluent re-use by Chalk Point Power Plant (Insufficient Flow to meet needs)**
 3. **Land Application (further investigation):**
 - **Rapid Infiltration**
 - **Large On-Site Disposal System**
 - **Slow Rate Infiltration (Spray/Drip Irrigation)**

BENEDICT CENTRAL SEWER SYSTEM EFFLUENT DISPOSAL SYSTEM SURFACE WATER DISCHARGE

- Surface water discharge means a direct outfall pipe to the Patuxent River
- Meeting with MDE

MDE Fish and Shellfish Division
Patuxent River is Approved
Shellfish Harvesting Water

**Significant Barrier to
Surface Discharge**



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Restricted – No direct harvesting, requests can be approved to relay shellfish for natural cleansing
Conditionally Approved – Direct harvesting except for 3 days following rainfall of 1 inch or more
Approved – Harvesting at any time in accordance with Department of Natural Resources Regulations

BENEDICT CENTRAL SEWER SYSTEM EFFLUENT DISPOSAL SYSTEM

LAND APPLICATION — LARGE ON-SITE DISPOSAL

Criteria:

- **Land Area:**
 - **25 to 37 acres (based on the highest permitted loading rate of 1.2 gallons/square foot)**
- **Soils**
 - **4 feet of separation from groundwater**
 - **Well Drained Soils**
 - **Uniform Soil Material is ideal**

MDE suggested that locating 25 to 35 acres that will allow a uniform loading rate 1.2 gals/sq. ft. will likely be very difficult. Therefore, this option was excluded from further consideration.

BENEDICT CENTRAL SEWER SYSTEM EFFLUENT DISPOSAL SYSTEM

Land Application Options



Centreville Spray Irrigation System

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Drip Irrigation System



Rapid Infiltration Basins

BENEDICT CENTRAL SEWER SYSTEM DISCHARGE OPTIONS

LAND APPLICATION — RAPID INFILTRATION

Criteria:

- **Land Area:**
 - **0.29 ac. to 5.84 ac.**
- **Soils:**
 - **10 feet of separation from groundwater**
 - **Well to excessively drained soils; sandy loam to sand (2 to 20 inches/hour permeability)**

Based on a Web Soil Survey Analysis it was determined that finding a site with favorable conditions would be very difficult in Charles County within 6 miles of Benedict.

BENEDICT CENTRAL SEWER SYSTEM DISCHARGE OPTIONS

LAND APPLICATION — SLOW RATE INFILTRATION

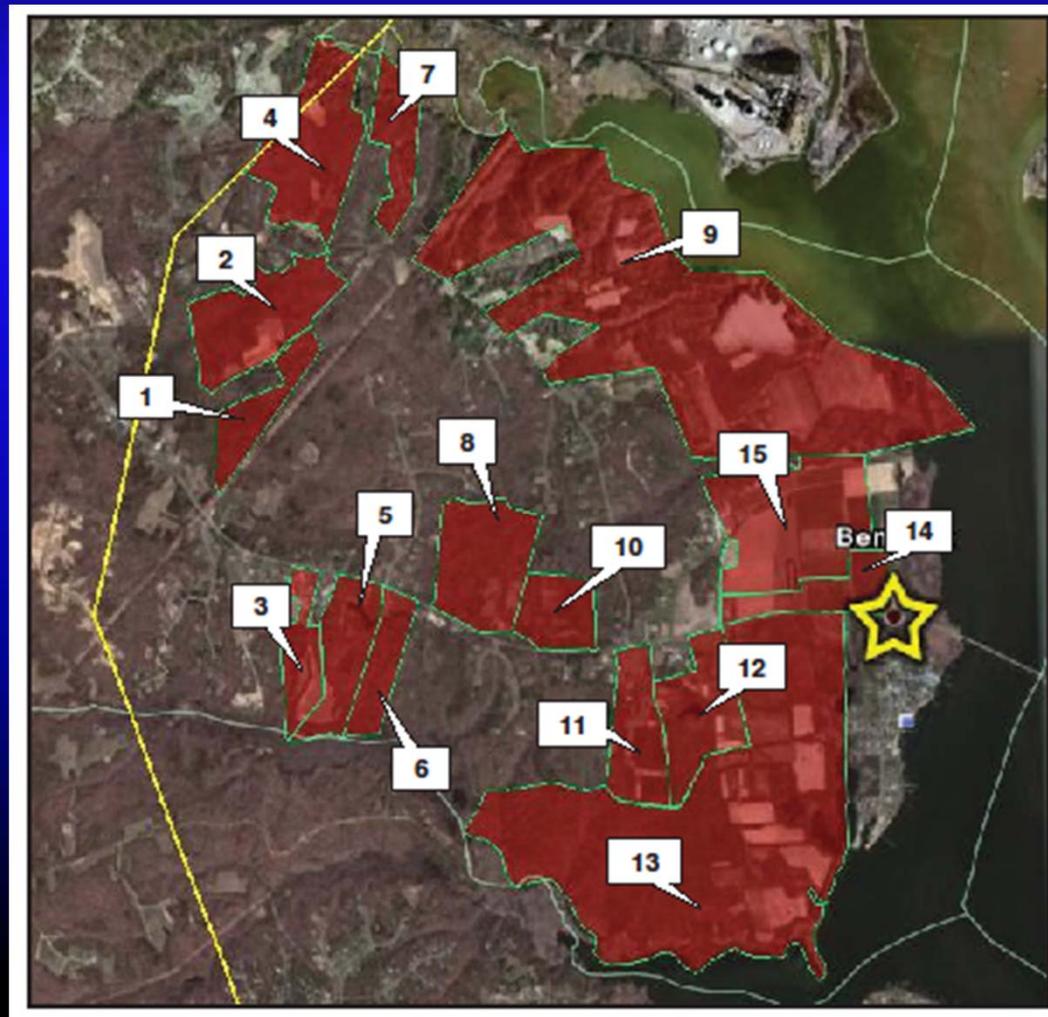
Criteria:

- **Land Area:**
 - **Spray Irrigation: 17 – 294 ac.**
 - **Drip Irrigation: 24 – 468 ac.**
- **Soils:**
 - **4 feet of separation from groundwater**
 - **Moderately well to excessively well drained soils (0.2 to 6 inches/hour permeability)**

This option was used as the basis for site selection.

BENEDICT CENTRAL SEWER SYSTEM DISCHARGE SITE SELECTION

Query Results (40+ acres within 3 miles of Benedict)



BENEDICT CENTRAL SEWER SYSTEM DISCHARGE SITE SELECTION

Query Results/Usable Acreage Analysis

- Most Favorable
- Favorable
- Least Favorable

- Sites Eliminated from Search
 - 1, 2, & 4 – Steep Slopes
 - 6 – Under Development
 - 7 – Marsh Land
 - 9, 12, & 13 – DNR Property
 - 14 – Small Usable Area
 - 15 – Ag. Preservation

Table V-2: Property Search Results for Slow Rate Land Application System

Site	Property Owner	Acreage	Usable Acreage	Address	Land Use	Distance from Benedict (miles)
1	MUNZ, JOHN A & FLORIE P	52	14	N/A	RESIDENTIAL	2.35
2	BUCKLER, THOMAS M	129	24	16889 TEAGUES POINT RD 20637	AGRICULTURAL	2.38
3	ENTZIAN, GARY A & TAMI M	51	43	BUCKTOWN RD.	AGRICULTURAL	2.13
4	GATEAU, ROBERT A & MARIA E	153	72	16984 TEAGUES POINT RD. 20637	AGRICULTURAL	2.53
5	AMBERLEIGH FARMS LLC	70	44	17099 PRINCE FREDERICK RD 20637	RESIDENTIAL	1.89
6	HAVRILLA, ANDREW V II	50	23	17215 PRINCE FREDERICK RD 20637	RESIDENTIAL	1.77
7	CECCHINI, LOUIS R & RACHEL M	57	15	6250 NANA DR 20637	AGRICULTURAL	2.34
8	LOVELESS, MICHAEL K	87	55	17340 PRINCE FREDERICK RD 20637	AGRICULTURAL	1.37
9	STATE OF MD DEPT OF NAT RES	671	360	TEAGUES POINT RD 20637	EXEMPT	1.79
10	WATERFORD SUBDIVISION LLC	47	42	7050 TANYARD PLACE 20637	RESIDENTIAL	1.11
11	WOOD, DARRELL R & BRENDA L	60	61	7265 KNOLLTOP PL 20637	AGRICULTURAL	0.91
12	STATE OF MD DEPT OF NAT RES	80	76	N/A	EXEMPT	0.63
13	STATE OF MD DEPT OF NAT RES	469	170	N/A	EXEMPT	0.91
14	SERENITY FARMS INC	50	10	PRINCE FREDERICK RD 20637	AGRICULTURAL	0.1
15	SERENITY FARMS INC	204	92	BLUEBIRD HILL PL 20637	AGRICULTURAL	0.23

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BENEDICT CENTRAL SEWER SYSTEM DISCHARGE SITE SELECTION USABLE ACREAGE METHODOLOGY

Property	Map Symbol	Texture	Acres	Slope	Drainage Class	Seasonal Water Table	Estimated Permeability
						(feet)	inches/hour
MUNZ	BaB	Silt Loam	3.5	2-5%	Moderately well drained	2.00	0.2045
	BaC	Silt Loam	25.7	5-10%	Moderately well drained	2.00	0.2045
	HgB	Loamy Sand/ Silt Loam	1.1	0-5%	Well drained	6.56	12.7675
	MfE	Fine Sandy Loam	1.2	15-25%	Well drained	6.56	1.9378
	MnB	Fine Sandy Loam	0.1	2-5%	Well drained	6.56	1.9378
	MnC	Fine Sandy Loam	0	5-10%	Well drained	6.56	1.9378
	MnD	Fine Sandy Loam	13.1	10-15%	Well drained	6.56	1.9378

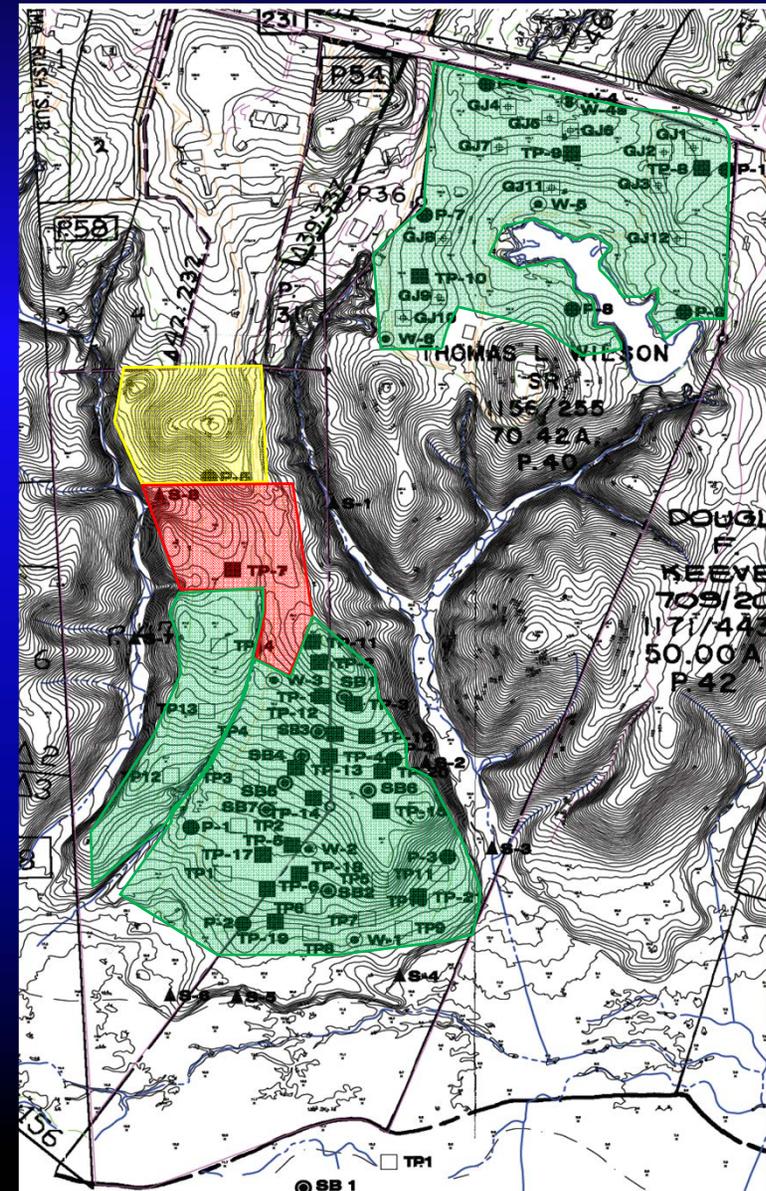
Estimate of Usable Acreage = 14.3 acres

BENEDICT CENTRAL SEWER SYSTEM DISCHARGE SITE SELECTION

- **Advised of Amberleigh Farms' approved preliminary plan of subdivision with 14 approved perc tests (existing percs = favorable site)**
- **Preliminary soils testing initiated on Amberleigh Farms**
- **As a backup plan, search expanded to include sites of 10 - 40 acres (multiple disposal sites).**
- **15 additional sites were selected.**
- **Letters of Interest mailed to 19 property owners.**
- **Received 10 responses; (9) positive, (1) negative, and (1) returned undeliverable.**

BENEDICT CENTRAL SEWER SYSTEM DISCHARGE SITE SELECTION

- Of 9 properties that provided positive responses, 4 were selected for preliminary soils testing by Health Dept. with all found to be favorable (backup plan in place)
- Tests performed on the 50 acres Serenity Farms site (#14) revealed a high water table
- Talks with owner of a site more favorable than Amberleigh Farms/Entzian property stall
- Hydrogeological Study initiated for Amberleigh Farms/Entzian Property in April 2010 (wet season)



BENEDICT CENTRAL SEWER SYSTEM DISCHARGE PERMIT APPLICATION

- Evaluation of Disposal Alternatives
 - Test Pits
 - Percolation Tests
 - Double Ring Infiltrometer Tests
 - Groundwater Monitoring Wells
 - Hydraulic Balance
 - Nutrient Balance
 - Site Capacity Evaluation



BENEDICT CENTRAL SEWER SYSTEM DISCHARGE PERMIT APPLICATION

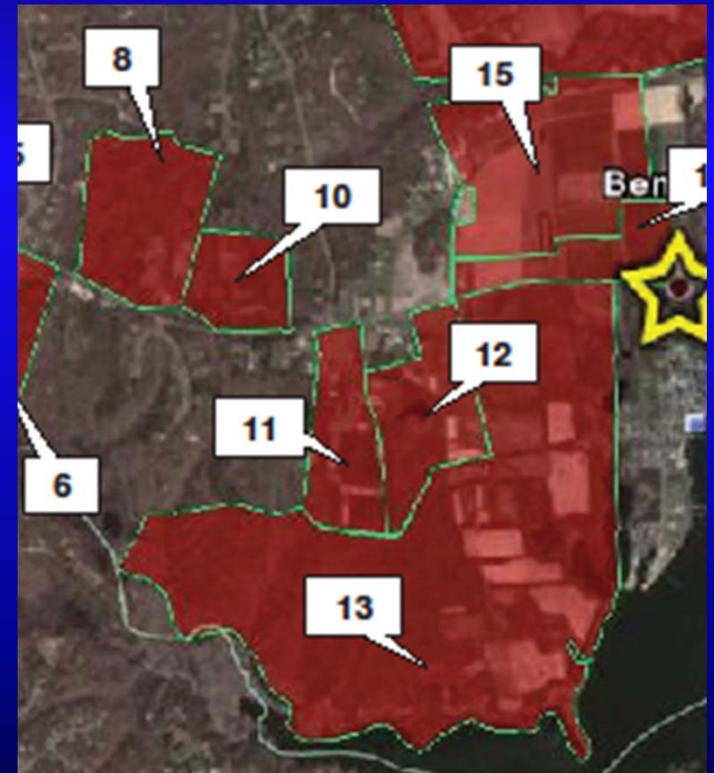
- Hydrogeological Study completed in October 2010.
- Study Results:
 - Site is most sufficient for spray irrigation
 - Site insufficient for drip irrigation, trench, sand mound, and rapid infiltration systems
 - Minimum required area = 21.2 acres
 - Site Disposal capacity = 62,160 gpd (design flow is 58,863 gpd)
 - Note: A total of 26.1 acres is available (75,690 gpd capacity)
 - **Spray Irrigation** is the uniform application of treated effluent directly onto the land surface with the understanding that it will infiltrate and percolate through the soil profile
- Nutrient Management Plan completed in March 2011

BENEDICT CENTRAL SEWER SYSTEM DISCHARGE PERMIT APPLICATION

- **Groundwater Discharge Permit Application submitted to MDE in June 2011**
- **Public Notice of permit advertised by MDE on March 7th and again on March 14th of 2012.**
- **Public Hearing requested and held on May 23, 2012.**
- **2nd Public Hearing held on June 26, 2012.**
- **Permit issuance pending environmental site assessment of the proposed site by the County**
- **MDE will issue the Final Groundwater Discharge Permit w/ Permit Limits**
- **JMT to re-initiate detailed design of pump station, force main, treatment plant and effluent disposal system based on permit limits**

BENEDICT CENTRAL SEWER SYSTEM DISCHARGE PERMIT APPLICATION ALTERNATIVE SITE INVESTIGATION

- Staff re-engaged DNR and was again informed that land disposal of treated effluent was an inappropriate use of public land according to the current policy
- DNR Property = Sites 12 and 13
- Project briefing conducted at the September 11, 2012 County Commissioner's Meeting
- Commissioners agree to pursue the use of DNR property at the policy level
- Staff currently investigating permission to enter the site to conduct preliminary testing



BENEDICT CENTRAL SEWER SYSTEM CONSTRUCTION COST ANALYSIS

• Collection System (Gravity):	\$2,283,722
• Treatment System:	\$3,393,605
• Disposal System & Force Main:	<u>\$3,265,544</u>
TOTAL =	\$8,942,871

Cost/Developed Property (123) = \$72,706

Cost/Property (209) = \$42,788

Cost to be spread among all County rate payers

Original Cost Estimate : **\$3,243,412**

Cost/Existing Resident (123) = \$26,369

Cost/Property (233) = \$13,920

BENEDICT CENTRAL SEWER SYSTEM FISCAL NOTE

- Current Construction Budget = \$3,234,000
- Future Funding:
 - FY14: \$1,210,000
 - FY15: \$2,956,000
- Total Construction Funding: \$7,400,000
- Additional funding needed = **\$1.5M**
- Est. property acquisition costs = \$430,000
- Current ROW Budget: \$100,635
- Additional ROW funding needed = **\$330,000**
- **Total additional project funding needed = \$1.83M**

BENEDICT CENTRAL SEWER SYSTEM

RELATED PLANNING

BENEDICT CENTRAL SEWER SYSTEM RELATED PLANNING

Late 1990's – the Commissioners first address waterfront access issues and released the committee-driven Waterfront Development Report in 1999.



2007, the Commissioners established the goal of identifying and prioritizing certain waterfront opportunities for preservation and protection, public access, and/or development opportunities.



July 2009, a Cultural Resource Study was completed, which outlines the history of the village, known historic and archaeological sites, and the next steps for preservation, education, and interpretation. This document would be used as a resource for revitalization efforts.



November 2010, Benedict Waterfront Village Revitalization Planning began

BENEDICT CENTRAL SEWER SYSTEM RELATED PLANNING

The Benedict Concept envisioned a historic waterfront village with greater public access and waterfront amenities, adaptive reuse of historic structures, limited redevelopment of the existing commercial area, and a War of 1812/Civil War Interpretive Trail.



January 2012, After months of planning and active engagement of local citizens, key landowners, and the business community the County adopted the Benedict Revitalization Plan, which identifies and prioritizes physical improvements to enhance the image of Benedict as a unique waterfront area in Charles County.



Major revitalization plan objectives for infrastructure improvements include construction of a new sanitary sewer system, transportation upgrades for improved visibility, access, and identification along MD 231 and improvements to pedestrian circulation and safety within the village.

**Benedict Central Sewer System Briefing
Presented by:**

Planning & Growth Management

**200 Baltimore Street, La Plata, MD 20646
301-645-0627**

www.charlescounty.org

Mission Statement

The mission of Charles County Government is to provide our citizens the highest quality service possible in a timely, efficient, and courteous manner. To achieve this goal, our government must be operated in an open and accessible atmosphere, be based on comprehensive long- and short-term planning, and have an appropriate managerial organization tempered by fiscal responsibility.

Vision Statement

Charles County is a place where all people thrive and businesses grow and prosper; where the preservation of our heritage and environment is paramount, where government services to its citizens are provided at the highest level of excellence; and where the quality of life is the best in the nation.

THE END