

BENEDICT CENTRAL SEWER SYSTEM FEASIBILITY STUDY

March 14, 2007



CHARLES COUNTY MARYLAND
 Where Eagles Fly™

Presentation to:

County Commissioners of Charles County



Presentation Outline

A. Background

B. Wastewater Collection Options

C. Watercourse Discharge Limits

D. Wastewater Treatment / Disposal Options

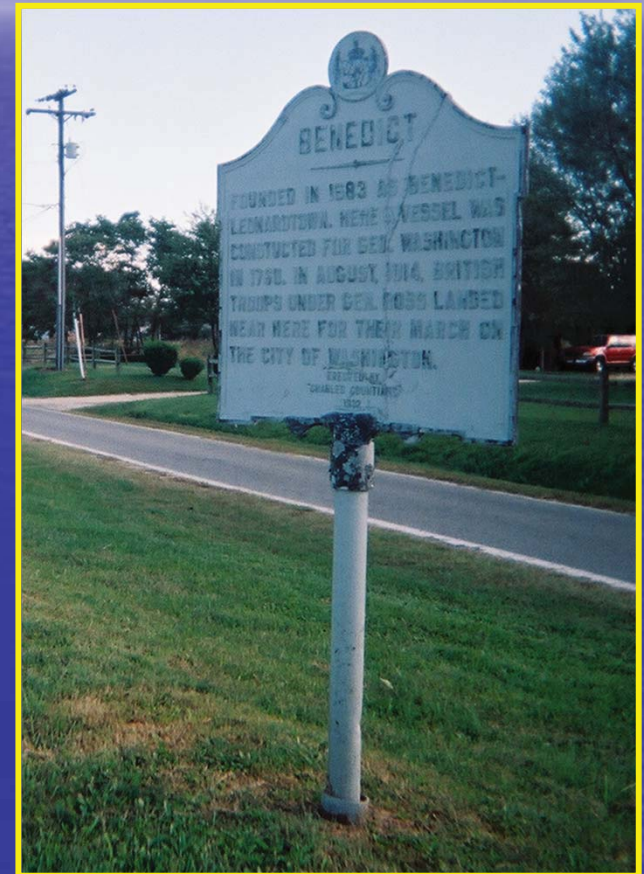
E. Costs

F. Alternate Treatment Process for Land Disposal

G. Conclusions and Recommendations

A. Project Background

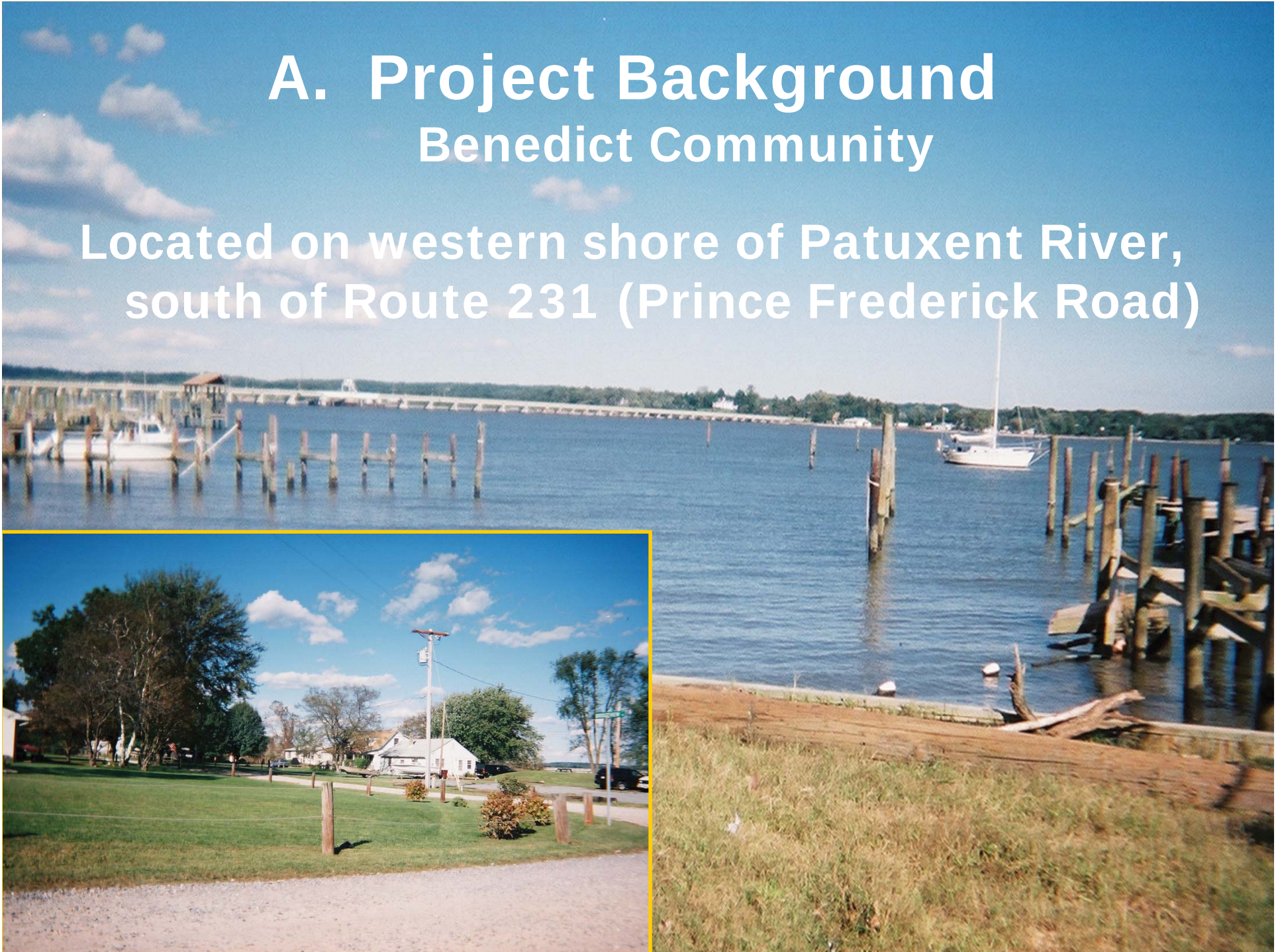
- Failing septic systems documented in Water and Sewer Plan
- 2004 sewer system feasibility study by Wallace Montgomery & Associates
- Report addressed options for:
 - Collection
 - Treatment
 - Disposal
- Maxwell Hall property as alternate land disposal site

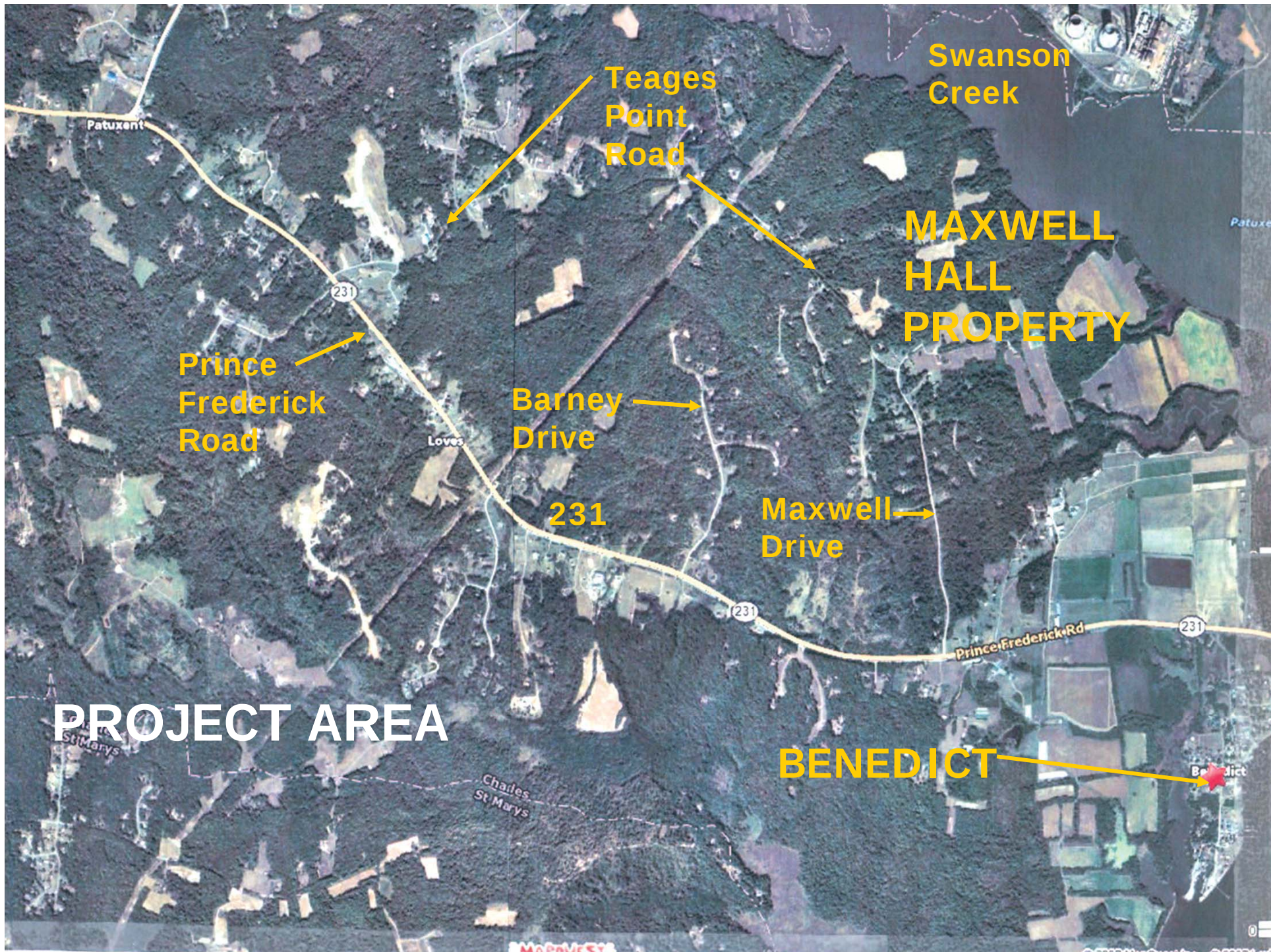


A. Project Background

Benedict Community

Located on western shore of Patuxent River,
south of Route 231 (Prince Frederick Road)





B. Wastewater Collection Options

1. Gravity sewers/ pumping station

- \$1.53 Million

2. Grinder pumps/pressure sewers (recommended)

- \$1.013 Million

3. Vacuum sewers/vacuum pump station

- \$1.050 Million

Note: 2004 dollars; costs exclude treatment and disposal

C. Watercourse Discharge Limits

PARAMETER	LIMIT	UNITS	DESCRIPTION
Biochemical Oxygen Demand (BOD ₅)	30	mg/l	Monthly Average
	45	mg/l	Max. Weekly Average
Total Suspended Solids (TSS)	30	mg/l	Monthly Average
	45	mg/l	Max. Weekly Average
Total Nitrogen (TN)	8.0	mg/l	Monthly Average
	12	mg/l	Max. Weekly Average
Total Phosphorus (TP)	2.0	mg/l	Monthly Average
	3.0	mg/l	Max. Weekly Average
Dissolved Oxygen (DO)	5	mg/l	Minimum
pH	6.5	S.U.	Minimum
	8.5	S.U.	Maximum
Total Residual Chlorine (TRC)	>0.1	mg/l	Non-detectable level
Fecal Coliform	14	MPN/100 ml	

C. Watercourse Discharge Limits

PARAMETER	LIMIT	UNITS	DESCRIPTION
Biochemical Oxygen Demand (BOD ₅)	30	mg/l	Monthly Average
	45	mg/l	Max. Weekly Average
Total Suspended Solids (TSS)	30	mg/l	Monthly Average
	45	mg/l	Max. Weekly Average
Total Nitrogen (TN)	8.0	mg/l	Monthly Average
	12	mg/l	Max. Weekly Average
Total Phosphorus (TP)	2.0	mg/l	Monthly Average
	3.0	mg/l	Max. Weekly Average
Dissolved Oxygen (DO)	5	mg/l	Minimum
pH	6.5	S.U.	Minimum
	8.5	S.U.	Maximum
Total Residual Chlorine (TRC)	>0.1	mg/l	Non-detectable level
Fecal Coliform	14	MPN/100 ml	

C. Watercourse Discharge Limits

- Requires Biological Nutrient Removal (BNR) treatment levels.
- Also requires no net increase in nutrients discharged from new plants
- For new plants, nutrient discharge offset by equivalent nutrient removal
 - From point sources
 - From non-point sources
- Correction of Benedict's failing septic systems: offset credit of 1,015 pounds/year total nitrogen.

C. Watercourse Discharge Limits

Level of Treatment

Design Flow = 81,000 gal./day

(243 service connections)

Level of Treatment	Nutrient	Effluent Concentration (mg/L)	Annual Loading (pounds)
BNR	Total Nitrogen	8	1974
	Total Phosphorus	2	493
ENR	Total Nitrogen	3	740
	Total Phosphorus	0.3	74

Note: ENR = Enhanced Nutrient Removal

C. Watercourse Discharge Limits

Level of Treatment

Design Flow = 81,000 gal./day
(243 service connections)

Level of Treatment	Nutrient	Effluent Concentration (mg/L)	Annual Loading (pounds)
BNR	Total Nitrogen	8	1974 (> 1015)
	Total Phosphorus	2	493
ENR	Total Nitrogen	3	740
	Total Phosphorus	0.3	74

Note: ENR = Enhanced Nutrient Removal

C. Watercourse Discharge Limits

Level of Treatment

Design Flow = 81,000 gal./day

(243 service connections)

Level of Treatment	Nutrient	Effluent Concentration (mg/L)	Annual Loading (pounds)
BNR	Total Nitrogen	8	1974
	Total Phosphorus	2	493
ENR	Total Nitrogen	3	740 (< 1015)
	Total Phosphorus	0.3	74

Note: ENR = Enhanced Nutrient Removal

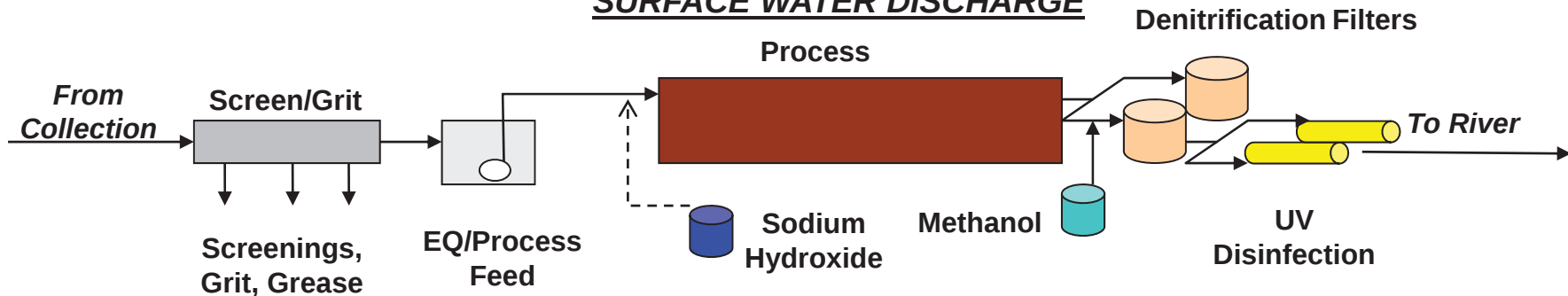
D. Wastewater Treatment/ Disposal Options

- Treatment
 1. Modified Ludzak-Ettinger (MLE)
 2. Schreiber® countercurrent aeration with DO control
 3. Sequencing batch reactor (SBR)
(recommended in study)
- Disposal
 1. Watercourse, to Patuxent River
(recommended in study)
 2. Land application (spray irrigation)

Note: level of treatment varies with disposal options.

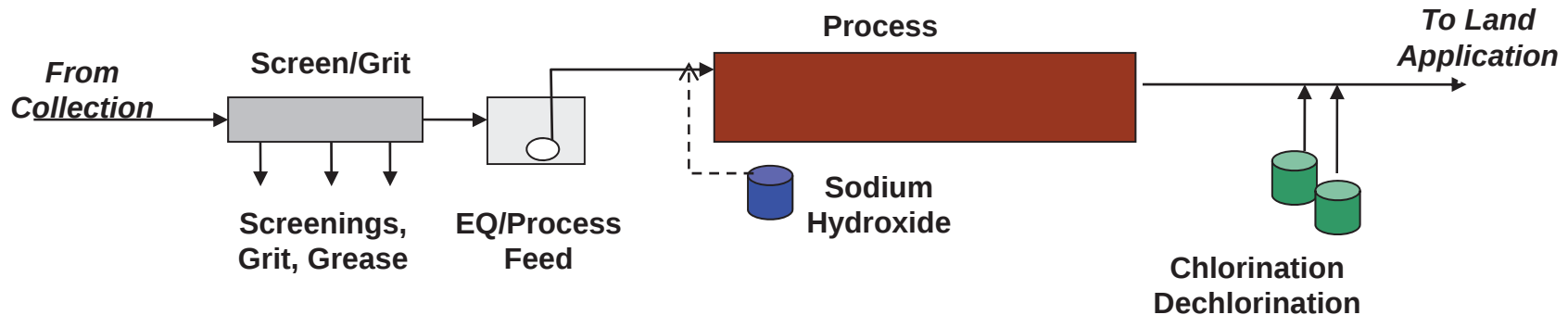
D. Wastewater Treatment Schematic Diagrams

CONCEPT FLOW DIAGRAM – SURFACE WATER DISCHARGE



ENR Treatment Level

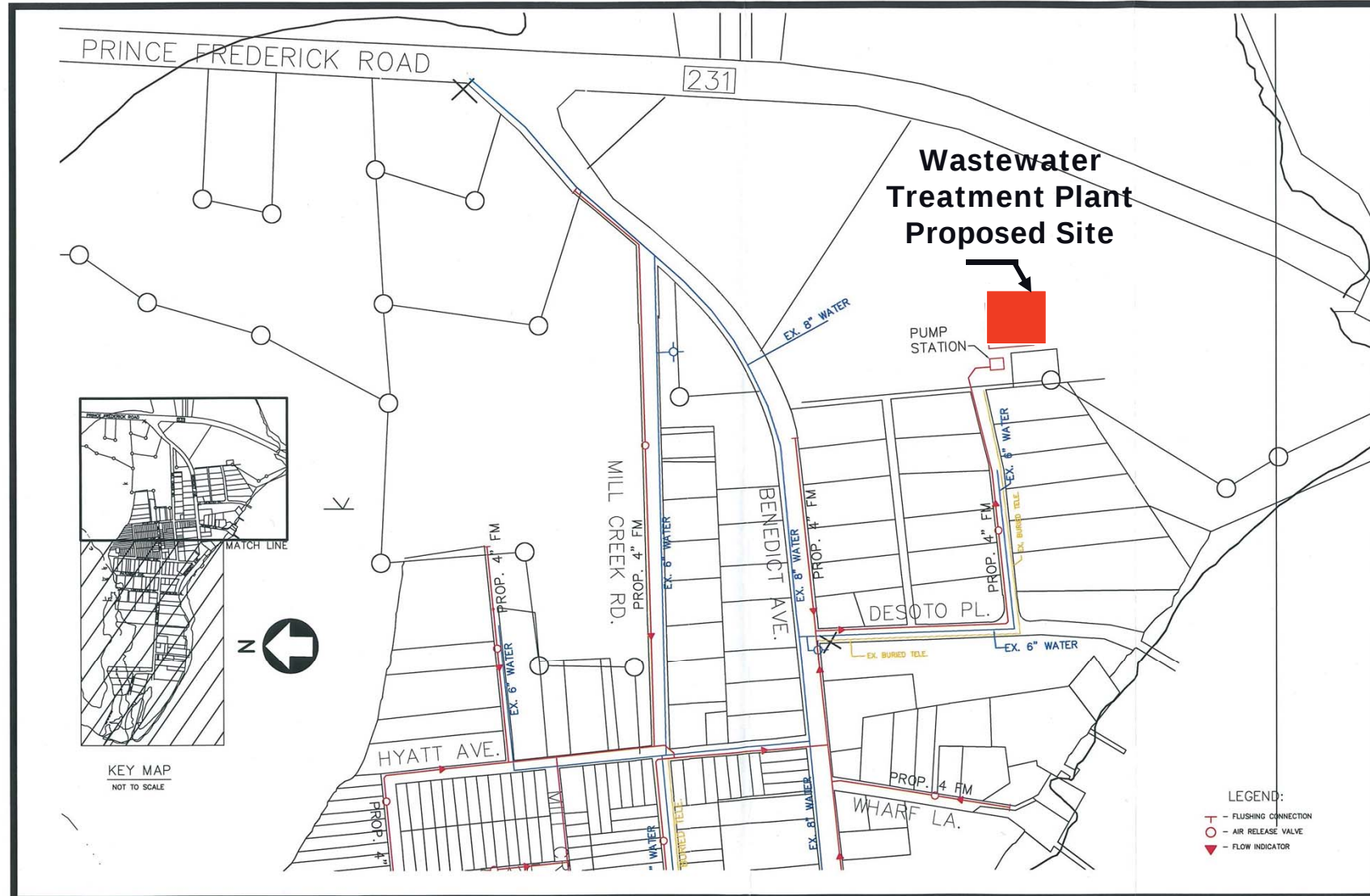
CONCEPT FLOW DIAGRAM – LAND APPLICATION



BNR Treatment Level

D. Wastewater Treatment

203014.00 UT04BENE.DWG



BENEDICT CENTRAL SEWER SYSTEM FEASIBILITY STUDY
CHARLES COUNTY PGM VCI# 03-0046
GRINDER PUMP PRESSURE SEWER - NORTH END

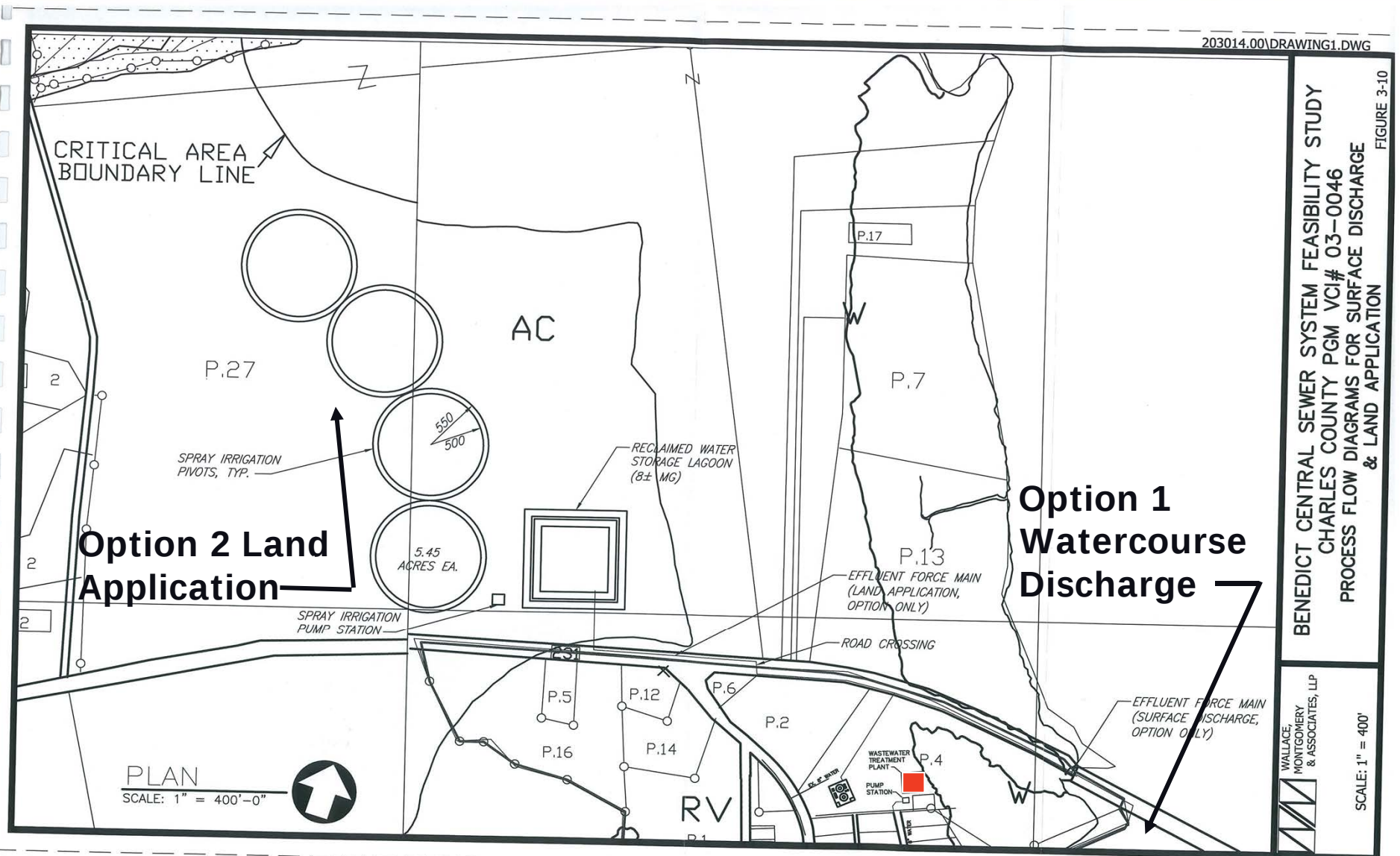
WALLACE,
MONTGOMERY
& ASSOCIATES, LLP

SCALE: 1" = 200'

LEGEND:
- FLUSHING CONNECTION
- AIR RELEASE VALVE
- FLOW INDICATOR

FIGURE 3-6

D. Wastewater Disposal Options



D. Wastewater Disposal Options

Land Application Methods



E. Costs

Treatment and Disposal

Report Alternate	Project Cost (millions)	Annual O&M Cost (thousands)
1a – Schreiber Process/Land Application	\$4.146	\$76
1b – Schreiber Process/Surface Water Discharge	\$2.178	\$63
2a – SBR/Land Application	\$4.427	\$76
2b – SBR/Surface Water Discharge	\$2.090	\$63

Note: 2004 dollars; costs exclude collection system

E. Cost

Total Costs - Recommended Alternatives

- **Collection Option 2 Grinder Pumps and Pressure Sewers - \$1.013 Million**
- **Treatment and Disposal Option 2b SBR/Watercourse Discharge - \$2.090 million**
- **Total cost of alternatives recommended by feasibility study - \$3.103 million**
- **Above costs are in 2004 dollars.**
- **Escalation at 5 % per year to 2010 - \$4.034 million**
- **\$3.5 million grant recently announced for project by Governor's Office**

E. Costs

Comments on Costs

- Assumes BNR treatment levels for land application
- Assumes plant location in Town (all options)
- Assumes sludge hauling to Mattawoman WWTP
- Excludes land costs
- O&M excludes sludge treatment/disposal
- O&M costs are low
 - Allows < 2 hours/day operations labor
 - Chemical costs low
- Outfall force main cost may be low

F. MDE Treatment Requirements for Land Application

Parameter	Class I (A)	Class II (B)
BOD ₅	70 mg/L	10 mg/L
Suspended Solids	90 mg/L	10 mg/L
Fecal Coliforms (MPN/100 ml)	200	3
pH	6.5 – 8.5	6.5 – 8.5

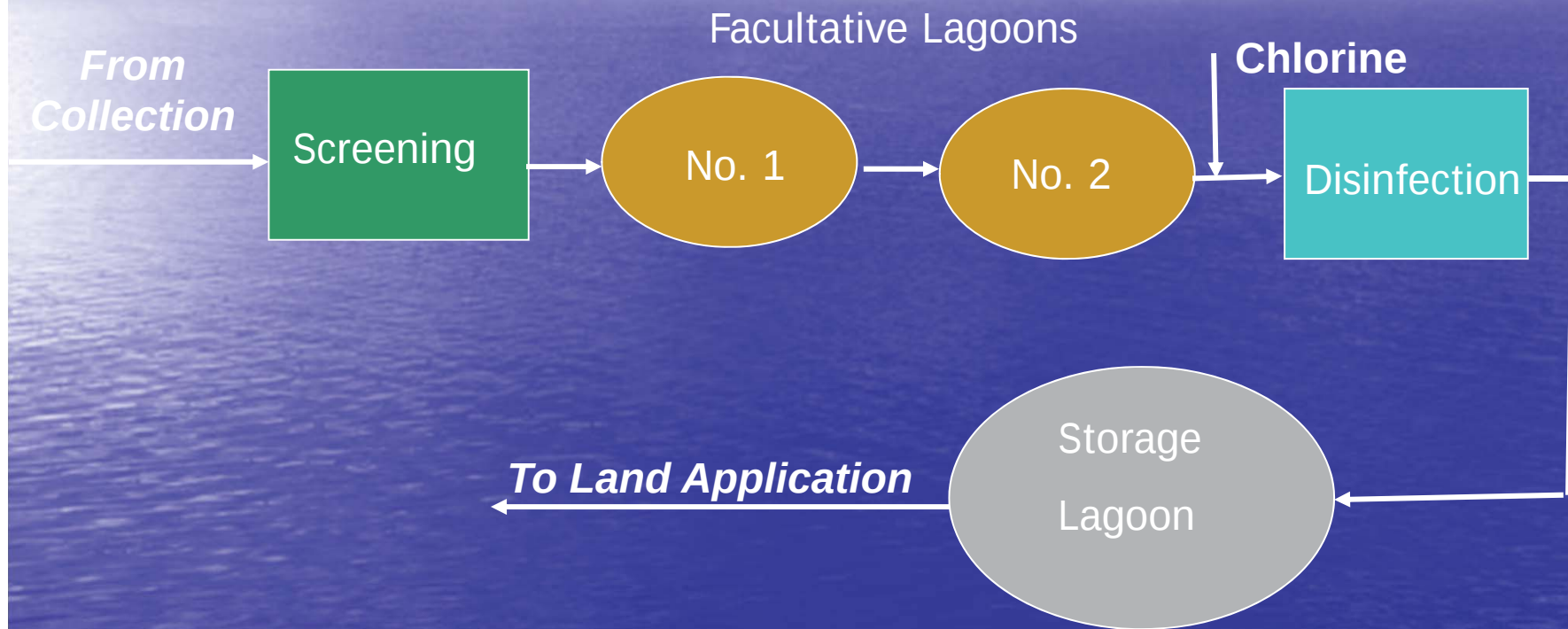
Note: nutrient removal not required

(A) Class I treatment required with 200 feet buffer around spray irrigation site.

(B) Class II treatment required with 25 feet buffer around spray irrigation site.

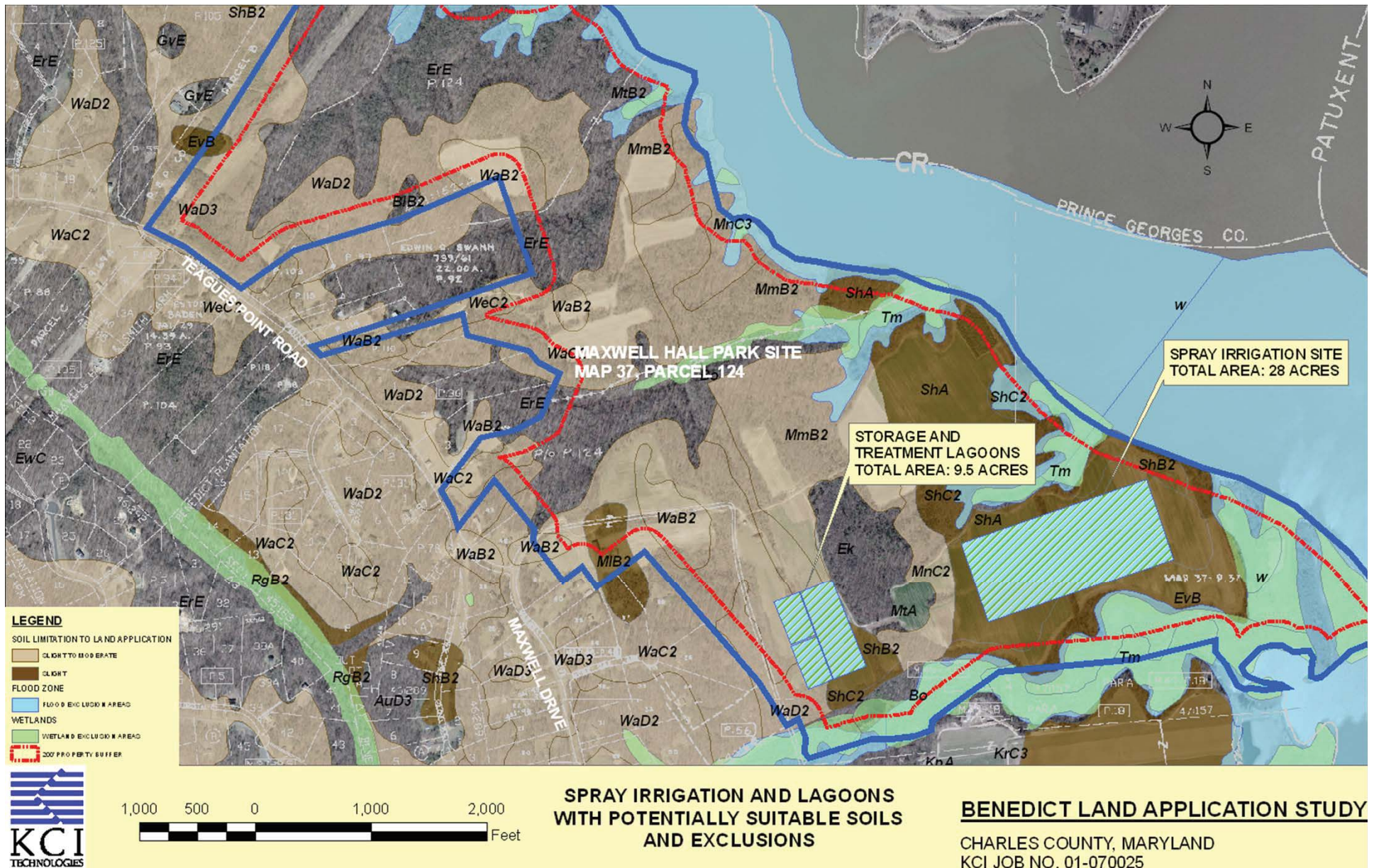
F. MDE Treatment Requirements

Schematic for Land Disposal

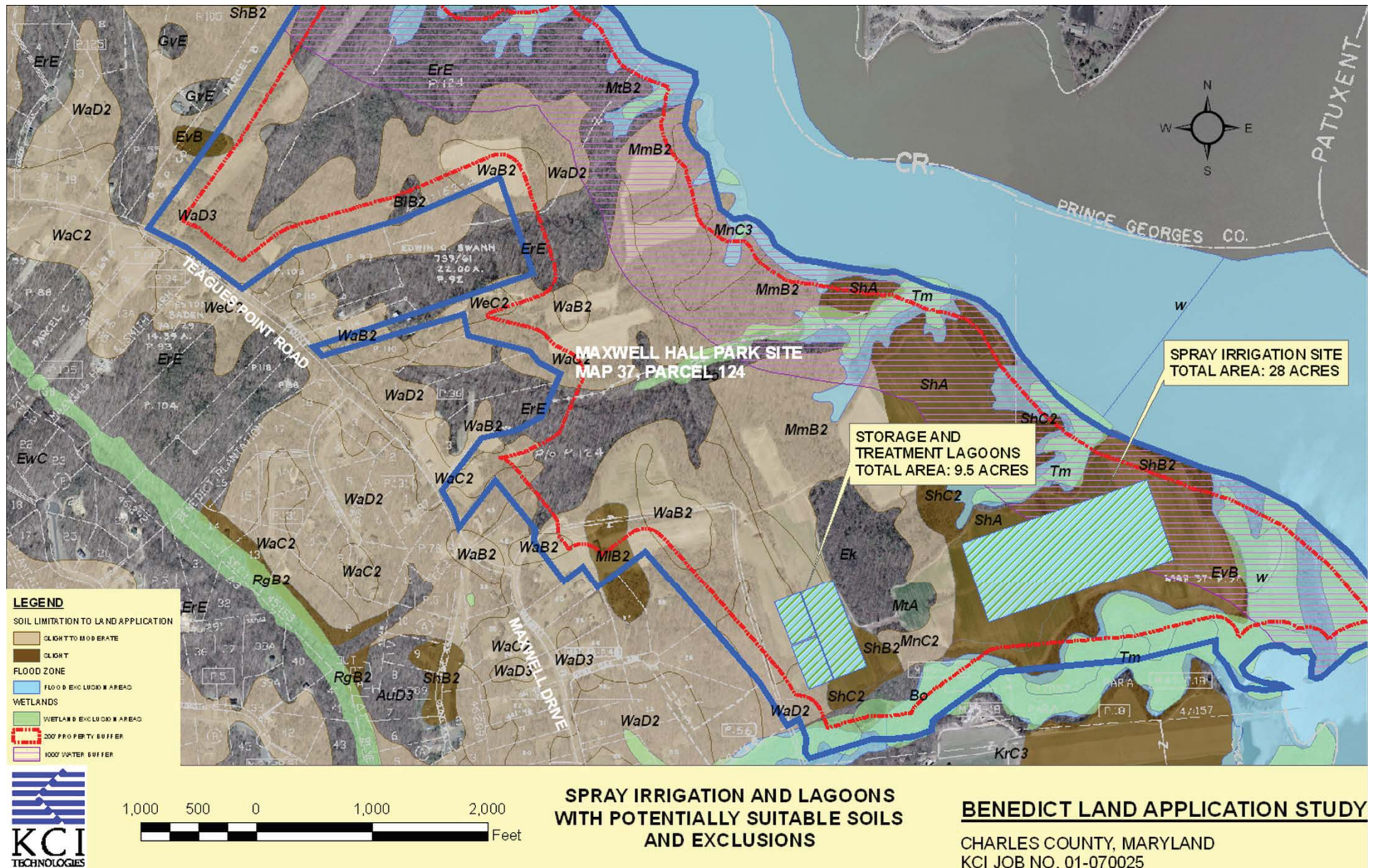


Class I Treatment (200 feet buffer)

F. Alternate Treatment/Disposal Site

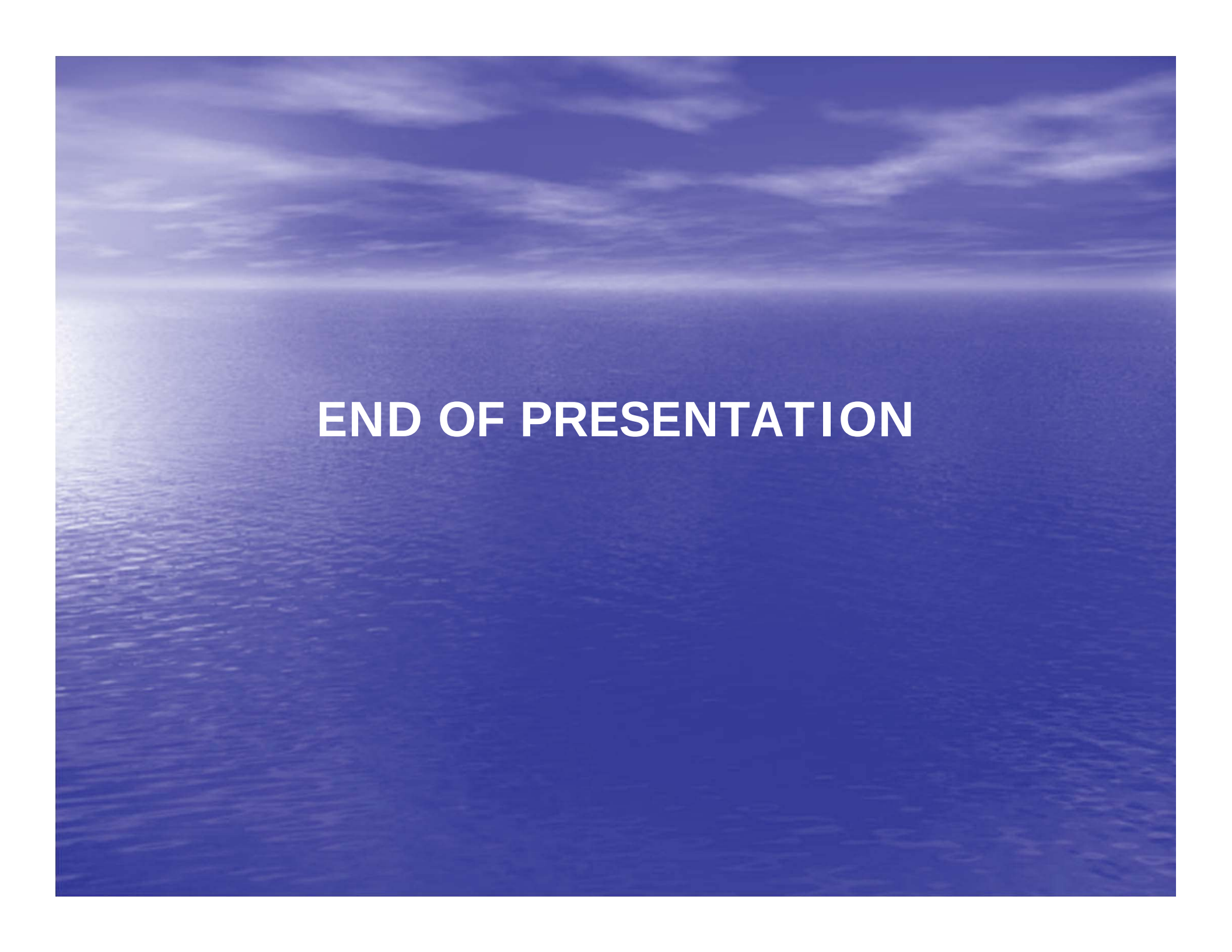


F. Alternate Treatment/Disposal Site



Conclusions and Recommendations

- MDE's preference is land application
- County owned park site can accommodate treatment and land application
- Land application is much simpler and more reliable
- Plant at Maxwell Hall removes plant from Town:
 - Preserves recreational use of Town site
 - Eliminates odor issues
 - Eliminates truck traffic in Town
- Costs for land application probably on par with watercourse discharge option
- Proceed with land application at Maxwell Hall



END OF PRESENTATION