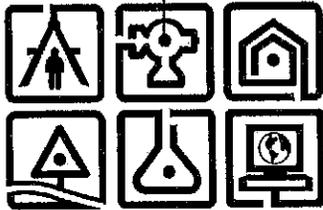


March, 2007



Feasibility Study  
Sanitary Sewer Service  
Village/Town of Red Hook, New York

*Prepared for:*

VILLAGE OF RED HOOK  
7467 South Broadway  
Red Hook, New York 12571  
and  
TOWN OF RED HOOK  
7340 South Broadway  
Red Hook, New York 12571



*Prepared by:*

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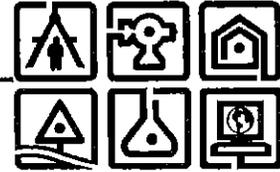
*C.T. Male Project No: 06.6213*

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March 21, 2007

Mayor David Cohen  
Village of Red Hook  
7467 South Broadway  
Red Hook, New York 12571

Supervisor Marirose Blum Bump  
Town of Red Hook  
7340 South Broadway  
Red Hook, New York 12571

Re: *Sanitary Sewer Feasibility Study*  
*Village and Town of Red Hook, Dutchess County, New York*  
*CTMA Project No. 06.6213*

Dear Mayor and Supervisor:

Attached is our feasibility study for your review and discussion with impacted parties.

The project appears feasible from the standpoint of the two (2) proposed developments. The costs for the owners along the commercial corridor may be too high to gain acceptance. A concerted effort should be made to find ways to reduce those costs.

Several issues will require answers prior to your making decisions. These include the determination of soils at any potential subsurface disposal site, determination of land availability and delineation of wetlands.

We look forward to assisting you in presenting these findings as well as performing future investigations.

Sincerely,

C.T. MALE ASSOCIATES, P.C.

A handwritten signature in black ink, appearing to read 'Gary R. Male'.

Gary R. Male, P.E.  
Managing Engineer/Principal

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**Feasibility Study  
Sanitary Sewer Service  
Village of Red Hook, New York**

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Feasibility Study  
Sanitary Sewer Service  
Village of Red Hook, New York

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## EXECUTIVE SUMMARY

The attached study to determine the feasibility of providing sanitary sewer service to portions of the Village and Town of Red Hook compares a gravity only collection system versus a gravity/grinder pump collection system. The study also compares treatment with discharge to the Saw Kill, to the Hudson River and to subsurface leach fields.

The least cost alternative over the long haul is a gravity/grinder pump collection system which flows to primary settling and a constructed wetland and discharge to the Hudson River.

The costs for the users along the commercial corridor are estimated approximately \$1,600 per parcel per year. These costs may be too high. Cost cutting or cost reallocation measures should be investigated as well as additional funding sources.

The concept of using grinder pumps in the dense commercial center of the Village may meet with opposition but we are convinced that it is the only feasible solution.

Prior to making a decision, soil testing, wetland delineation and land availability for the constructed wetland and the subsurface disposal should be further explored. The options and costs should also be thoroughly discussed with the community.

## **INTRODUCTION**

The Village of Red Hook, Dutchess County, New York in cooperation with the Town of Red Hook entered into contract with C.T. Male Associates, P.C. to prepare a study of the feasibility of providing sanitary sewer service to portions of the Village and adjacent areas of the Town.

## **BACKGROUND**

The Village of Red Hook is a small Village within Town of Red Hook, Dutchess County, New York. The total area of the Village is 1.08 square miles and the population within the Village totals 1,805 persons as recorded by the 2000 census. The portions of the Town to be included in the study area are generally adjacent to the Village, just to the south. The treatment system may also be located in the Town.

## **GOAL OF THIS STUDY**

The goal of this study is to determine the feasibility of providing public sewer service to the Route 9 corridor extending into the Town of Red Hook on the south and to the end of the existing commercial usage along on the north. Included in the goal is to study providing sewer service along Route 199 both east and west of Route 9 to the extent that commercial development exists.

The existing commercial corridor at the center of the Village is viewed to be restricted in the use of the land by the reliance on subsurface disposal.

Village and Town officials have been conferring with the Dutchess County Planning Department about the possibility of a 400 unit development with 150,000 SF of commercial space south of the Village in the Town.

Discussions have also been held about a similar 200 - 250 unit development at the north end of the Village along Route 9.

These two proposed developments provide additional impetus for the development of a sewer system.

## **COMPREHENSIVE PLANNING**

New York State Village Law requires that a sewer system that is designed for a Village be designed for the entire Village. This requirement is to ensure that proper planning take place.

A design to provide sewer service to the entire Village is included. It is not the intention to implement it at this time because areas of lower density (single family residential areas) generally are being well served by their septic systems or they can be supported by new septic systems.

## **TOPOGRAPHY**

The study area of the Village and adjacent areas within the Town are generally quite flat with elevations being between USGS elevation 215 - 225 in most of the area. The exceptions are the residential areas along the western edge of the Village, the high ground on the eastern edge of the Village where the water tower is located, and the portion of Linden Avenue near the Saw Kill.

However, the commercial corridor along the two State Highways (Route 9 and Route 199) is generally quite flat.

## **SOILS**

The Village is underlain by soils of the Hoosic Loam and Hoosic Gravelly Loam groups. These are a well drained soil which accounts for the success of subsurface sewage disposal in the Village and portions of the Town.

Percolation rates in the area are reportedly in the 1 - 5 minute range.

## **WATER SERVICE**

The entire area to be included in the proposed sewer service area is already serviced by the Village water system or will be when the residential or commercial subdivisions are built.

### ESTIMATED SEWAGE GENERATION AND SEWAGE STRENGTH

The feasibility study has been prepared assuming sewage generation as follows:

- 300 gpd/Residential Unit
- 1500 gpd per Acre of Commercially Zoned Land
- 0.1 gpd per Square Foot of Proposed Commercial Building

The generated flow is assumed to have typical strength as follows:

CBOD <sub>5</sub> :	200 mg/l
Suspended Solids:	240 mg/l
Nitrogen:	40 mg/l
TKN as N:	14 mg/l

### RED HOOK SEWAGE GENERATION PROJECTION

Water Use Today:	170,000 gpd
Add 400 Units in South:	120,000 gpd
Add 250 Units in North:	75,000 gpd
Add 100 Units at Perx:	<u>30,000 gpd</u>
	395,000 gpd

Reasonable Growth 25%                      493,750 gpd

Ultimately to serve the entire Village and adjacent area of the Town assume: 500,000 gpd

Initial development would include:

400 Units in South:	120,000 gpd
250 Units in North:	75,000 gpd
100 Units in Perx:	<u>30,000 gpd</u>
	225,000 gpd

7,000' Corridor Along Route 9

Use 400' wide (200' each side) = 65 acres

Use 1,500 gpd/acre x 97,500 gallon per day

Commercial Development Proposed as part of South Development

150,000 SF @ 0.1 gpd/SF = 15,000 gpd

337,500 Calculated Initial Generation

Therefore:

Use: 350,000 gpd Initial

150,000 gpd Phase II

500,000 Ultimate Total Design Flow

## **DESIGN CHALLENGES - COLLECTION SYSTEM**

The Village and adjacent areas of the Town are very flat which creates the need for installing sewers at a greater depth and the need for several sewage pump stations. Both of these add to the cost of construction.

The Village is bisected by 2 state highways, U.S. Route 9 and NYS Route 199. New York State DOT normally does not allow the sewers to be constructed in these highways or for the highway structures to be damaged by the construction. In addition, many homes and businesses along both Route 9 and Route 199 are very close to the road. This leaves little room to construct the sewer along the street in the front yards. Therefore, the design of a conventional gravity system will involve numerous easements in order to allow the installation of conventional gravity mains at the rear of many of the properties.

The rear yard sewers will, in several instances, be located in the parking lots for stores along Broadway and Market Street. The easements, which allow the construction in the parking lots and other rear yard areas, will be an encumbrance on the property which may restrict future changes in property use or configuration.

The project area has few underground utilities which will make construction easier. There is buried water and some buried telephone and storm sewer. However, gas

service is by propane tank at each building and electric service and most telephone is overhead.

## **SYSTEM DESIGN**

Design of a proposed sewer system will be in accordance with the requirements of the New York State Department of Environmental Conservation as contained in the "Recommended Standards for Wastewater Facilities" published by the Great Lakes - Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers. These are better known as the 10-States Standards.

The feasibility study presents a traditional gravity sewer system as well as a gravity sewer/pressure sewer system. The pressure sewer portions have been added where conventional gravity sewers are almost impossible to construct along the fronts of the properties.

The feasibility study also presents several options for treatment. A conventional treatment plant discharging to the Saw Kill is presented. Other options such as constructed wetlands, subsurface disposal and discharge to the Hudson River are also explored.

## **COLLECTION SYSTEM ALTERNATIVES**

The project is being driven by the need for sanitary sewer service at the commercial center of the Village and by proposed future developments. These future developments are a potential 400 unit development south of the Village in the Town which would include neighborhood commercial development and potential 200 - 250 unit development at the north end of the Village.

The collection system configuration varies somewhat depending on which of the proposed developments proceeds first. However, each configuration includes several sewage pumping stations, a substantial footage of gravity sewers and force mains. The option to use pressure sewers at the core of the Village commercial area works with any of these configurations.

As the concepts have progressed, we have come to regard the all conventional gravity sewer option as almost too cumbersome to be implemented. In addition, we have

estimated that the capital cost of the gravity alternative is about \$2.6 million greater than the alternative using grinder pumps to serve the core of the Village.

The gravity sewer collection system for the service area and the entire Village is shown on Figure 1 contained in a pocket at the rear of the report.

### **PRESSURE SEWERS FOR THE VILLAGE CENTER**

In order to overcome the problem of rear yard sewers and the need for numerous easements, consideration has been given to the use of pressure sewers. The pressure sewers would involve 1 ½ -inch to 8-inch force mains in the vicinity of and under the sidewalk. Each property to be served would have a grinder pump and a small diameter pressure sewer which would connect to the force main under the sidewalk. The grinder pump enclosures are available in several different configurations which allow either being buried outside or, if no room exists, be located in the basement. These systems are also available in simplex, duplex or greater arrangements for larger flows.

The force main under the sidewalk could be directional drilled into place, needs only to be 5' underground and need not be to grade since the flow is being forced through by pumps. The pumps could be located in the rear yards or in the basement and the small diameter pressure sewer will connect to the force main. The sidewalk will have to be excavated to make each connection.

The pressure/gravity sewer layout and the developer projects are shown on Figure 2 and Figure 3 contained in pockets at the rear of the report. Figure 2 assumes the north development proceeds first and Figure 3 assumes the south development proceeds first.

### **TREATMENT**

There are several treatment options and there are several options for discharge location. The location of the discharge dictates the degree of treatment.

This study evaluated three (3) possible discharge locations as follows:

- A. Discharge to the Saw Kill.
- B. Discharge to the Hudson River.
- C. Subsurface discharge.

The options for discharge to each of these will be evaluated on a preliminary basis.

A. Discharge to the Saw Kill

The treatment configuration presented here is secondary treatment with nitrification, effluent filtration and U.V. disinfection. The plant will include sludge digestion. This is a tertiary treatment plant.

The need for a septage receiving station will be evaluated during design. It may be advisable to include a septage receiving station at the treatment plant since much of the Village and Town will continue to use subsurface disposal.

The preliminary design of the wastewater treatment plant will be coordinated with the Dutchess County Water and Wastewater Authority which will in all likelihood be the operator.

The preliminary effluent limits for the discharge to the Saw Kill have been established by the New York State DEC. They are as follows:

CBOD <sub>5</sub> :	10 mg/l
TSS:	10 mg/l
DO:	>7 mg/l
SS:	0.1 mg/l
Ammonia	1.8 mg/l (June-Oct.), 3.8 mg/l (Nov.-May)
PH:	6 - 9
Fecal Coliform:	200/400 per ml
Residual Chlorine:	0.1 mg/l

A tributary of the Saw Kill west of Benner Road can also receive the flow but at lower ammonia discharge limits. The use of less sophisticated treatment systems than a tertiary treatment plant will not meet the effluent requirements.

A schematic of the treatment plant is included as Figure 4.

B. Discharge to the Hudson River

The effluent limits for the discharge to the Hudson River are substantially less stringent than those listed above for the Saw Kill. This is due to substantial assimilative capacity

of the Hudson River versus the Saw Kill. The effluent limits for the Hudson River at Barrytown are secondary limits as follows:

CBOD <sub>5</sub> :	30 mg/l
TSS:	30 mg/l
DO:	No Limit
SS:	0.1 mg/l
Ammonia	No Limit
PH:	6.0 - 9.0
Fecal Coliform:	200 colonies/100 ml
Residual Chlorine:	2.0 mg/l

These discharge limits would allow the use of secondary treatment without nitrification and would also allow the use of primary settling with a constructed wetland.

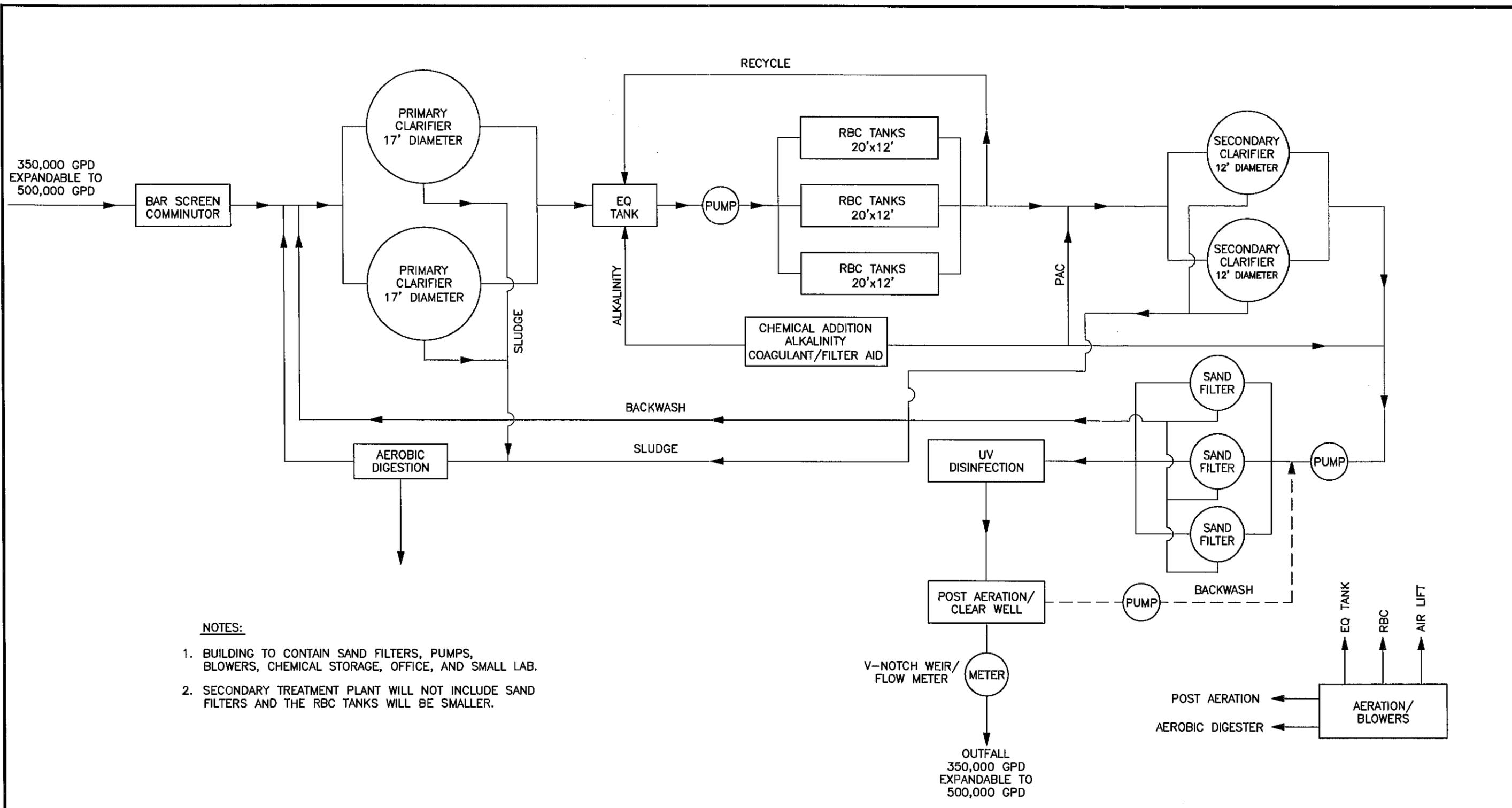
A schematic of the treatment plant is included as Figure 4.

### C. Subsurface Disposal

The use of subsurface disposal field to dispose of up to 350,000 gallons per day would probably be a first of its kind installation. Traditional design guidance limits subsurface disposal to 200,000 gallons per day. However, the soils throughout much of the Village and adjacent areas in the Town are very conducive to the use of subsurface disposal and the community seems to be find the option appealing.

Typically, subsurface disposal is preceded by primary settling in the form of a septic tank. In this case, due to the amount of flow there would be numerous septic tanks required. In order to make it easier to handle the sludge generated, we have included primary settling tanks (2) of the type normally used at a sewage treatment plant rather than the multiple septic tanks. Primary settling uses very little energy. In this case we have also included aerobic digestion to condition the sludge prior to transport.

The nitrate loading to the groundwater is a major concern if subsurface disposal is to be considered. In order to remove some of the nitrate from the discharge, some form of treatment must be included after the primary settling. A treatment plant could be used to remove nitrogen but that would result in using a tertiary treatment plant to dose a subsurface disposal field which would be overkill.



- NOTES:**
1. BUILDING TO CONTAIN SAND FILTERS, PUMPS, BLOWERS, CHEMICAL STORAGE, OFFICE, AND SMALL LAB.
  2. SECONDARY TREATMENT PLANT WILL NOT INCLUDE SAND FILTERS AND THE RBC TANKS WILL BE SMALLER.

CAD DWG. FILE NAME: 4 TREATMENT PLANT.DWG

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 SCALE : NONE  
 DATE : MARCH, 2007

## CONCEPTUAL TERTIARY WASTEWATER TREATMENT PLANT SCHEMATIC

### VILLAGE/TOWN OF RED HOOK

#### RED HOOK SANITARY SEWER FEASIBILITY

VILLAGE/TOWN OF RED HOOK DUTCHESS COUNTY, NEW YORK

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ARCHITECTURE & BUILDING SYSTEMS ENGINEERING \* CIVIL ENGINEERING  
 ENVIRONMENTAL SERVICES \* SURVEY & LAND INFORMATION SERVICES

# FIG 4

SHEET OF

DWG. NO:

Information collected as part of this study suggests that constructed wetland can be designed to remove sufficient nitrogen to allow a discharge to a subsurface disposal system. The preliminary design of the wetland in accordance with USEPA guidance has been used to determine the acreage required.

## **DISCUSSION OF TREATMENT OPTIONS/DISCHARGE LOCATIONS**

Discharge to the Saw Kill provides a clear cut set of standards to be met. The discharge limits are stringent enough that only a tertiary treatment plant will reliably meet them in our opinion. Regardless of its size, a constructed wetland would always run the risk that dying plant material would cause the suspended solids to exceed the limit for discharge to the Saw Kill. The constructed wetland would also be unreliable at meeting the ammonia limit.

Discharge to the Hudson River is probably the safest course to pursue. In our opinion, primary settling followed by a constructed wetland could meet the effluent discharge standards for a Hudson River discharge. Following the wetland, the effluent would flow to a pumping station and be pumped to the high point along Route 199 west of the Village. From there a gravity sewer would carry the discharge in the river.

A second scenario for discharge to the Hudson River is also possible. If Bard College wanted to enter into a joint venture with the Sewer District, the treatment could be moved to an area downstream of Bard College. In that case, the primary settling and the treatment works would be moved to nearer the river and the Sewer District would be pumping raw sewage westerly toward the river to treatment, whatever form it takes.

The option of subsurface disposal will require 12 acres for the subsurface disposal field(s). The fields can be located in several locations (not all in the same place) and they can be under park land or playing fields. The wetland to reduce the nitrate concentration will also require a considerable amount of land. The option of a dual use for the land occupied by the subsurface disposal fields is an attractive one.

## **PROJECT PHASING - COLLECTION SYSTEM**

The timing of the construction of the north and south development areas impacts the cost of the portion of the system which serves the Village Center. The cost estimates

currently included envision the north development being the first to be constructed and the Village/Town District being constructed to flow to the north development sewer system. That phasing sequence causes additional expense due to the need for a temporary pumping station and force main to serve users who would otherwise naturally flow to the south development system.

If the phasing were different, the cost of the temporary pumping station and force main could be saved.

### **COMPARISON OF ALTERNATIVES**

The construction of a sewage treatment plant, whether it be a secondary treatment process to flow to the Hudson River or a tertiary treatment process to flow to the Saw Kill, is a known entity which takes up little land and can be sited in a variety of locations. It will be energy intensive, the tertiary plant more so, and its siting may be unpopular and controversial.

A discharge to the Saw Kill, a trout sport fishing stream, will be controversial but the effluent discharge limits are available and attainable. A discharge to the Hudson River will also be controversial but probably less so. The effluent discharge limits for the Hudson River are more attainable and could be achieved by a secondary treatment plant or primary settling and a constructed wetland.

A treatment plant or primary settling effluent together with a constructed wetland could be discharged to subsurface disposal. Generally, much of the area has soils which are suitable although the specific site would need to be checked. This could lead to a multi-use facility with subsurface disposal underneath park land or playing fields. The drawback to the concept is maintenance (removal/replacement) when it becomes necessary. If the other use in the dual use concept involves a large segment of the community, as playing fields would, the disruption caused by maintenance could be very divisive to the community.

Both the subsurface disposal and the wetland require large areas of land with specific characteristics. The subsurface disposal requires land which can be made flat and still have sufficient soil with a good percolation rate to allow for the construction and permitting of the disposal area. The wetland requires land that can be made flat and

which is not an existing wetland. If the wetland site was underlain by tight clays which were non-porous, the construction cost could be reduced.

The route of the discharge to the Hudson River falls quite rapidly from elevation 275 or so at the crest of Route 199 to about elevation 20 at the river. Finding sites along that route for 8 acres of wetland may be difficult although a couple of relatively flat sites do exist.

### **FRESHWATER WETLANDS**

The existing freshwater wetlands are important in this analysis because they can't be destroyed in order to construct the project elements without significant permitting and mitigation. There are freshwater wetlands west of the Village and south of Route 199. There are also freshwater wetlands along the Saw Kill. A map of the approximate location of the mapped freshwater wetland is included as Figure 5.

Not all state and federal wetlands are mapped. A field review of any areas proposed for construction will be required to determine if wetlands are present. This is particularly true of large parcels required for subsurface disposal or for constructed wetlands.

### **PROJECT COSTS**

Project cost estimates have been developed for each of the project elements. As stated previously, the way that the project evolves will have some impact on the cost.

The cost estimates are included in Appendix A.

### **FEASIBILITY ANALYSIS**

The preliminary estimates of cost for the entire sewer system range from \$12,000,000 to \$13,500,000 depending on which set of alternatives meets the needs of the community.

There are 140 existing properties along Routes 9 and 199 which will receive service if the district is approved plus approximately 215 residential units in the north development and 400 in the south development, plus additional commercial development in the south area.



**Figure 5: Town and Village of Red Hook Wetlands**

Town of Red Hook

Dutchess County, New York



**C.T. MALE ASSOCIATES, P.C.**

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Environmental Services \* Geographic Information Services

**MAP NOTES:**

Full Color Aerial Photography flown April, 2004.

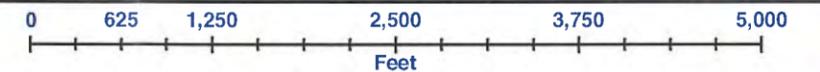
Photo Resolution: 1 ft./pixel.

Horizontal Photo Accuracy: +/- 4 ft.

**Scale: 1 inch equals 1,250 feet**

Project Number: 06.6213

Data Source: NYSGIS Clearinghouse; Dutchess County



- Village of Red Hook Boundary
- Major Roads
- <all other values>
- Hudson River
- FWA (State) Wetlands
- Red Hook Tax Parcels



If the north development funds the downstream trunk sewers, treatment and discharge, the estimated costs would be as follows:

Trunk Sewer North Portion:	\$1,760,000
Treatment and Discharge to River:	<u>\$4,840,000</u>
Total to North Developer:	\$6,600,000

COST PER UNIT: \$30,700/(215 Units)

The south developer would be required to install between \$2,700,000 and \$3,000,000 in improvements to connect to the system. Since the development totals 400 units of residential plus commercial, the cost of the off-site sewer would be under \$7,500/unit.

The Red Hook schools would be responsible for approximately \$250,000 in costs to connect into the system.

The initial district would include the 140 commercial properties along Routes 9 and 199. The estimated cost for that portion of the work would be approximately \$3,500,000. Taken over 30 years at 5% interest rate the annual debt service would be \$227,700 or \$1,625/yr per property. For residential properties this would be considered excessive but to commercial property owners it may be worth it. The expense also has to be submitted to the NYS Comptrollers office for review.

#### Operational Cost

The new collection system will require minor operation and maintenance expenditures. The pumping stations will use electricity, and at least during the startup period, they will use chemical addition to control corrosion and odors. Normally, pumping stations will require scheduled visits by a maintenance crew. If the Dutchess County Water and Wastewater Agency performs operations, these will become a part of their rounds.

The treatment plant, if one is constructed, will be the major operational cost. We expect that the operational cost of the plant plus the collection system will be \$250,000 - \$300,000/year.

If a constructed wetland/subsurface disposal system is constructed, the O&M expense will be substantially reduced. We expect that the expense will be \$100,000 - \$150,000/year.

Present Worth Analysis

A 30 year present worth analysis has been done to compare alternatives. The data entered into the analysis to perform the comparison is listed below:

It is assumed that inflation is 3% and the cost of money is 5%.

A. Cost of the Alternative Project

1)	Constructed wetland to Hudson River discharge	\$13,351,000.00
2)	Constructed wetland to subsurface disposal	\$13,631,000.00
3)	Tertiary treatment/ discharge to Saw Kill	\$12,086,000.00

B. Annual Operating Cost

1)	Constructed wetland to Hudson River	\$150,000.00
2)	Constructed wetland to subsurface discharge	\$150,000.00
3)	Tertiary treatment/ discharge to Saw Kill	\$300,000.00

C. Pump Station Rehabilitation

(Assume \$100,000 rehab per pump station in 20 years)

1)	4 pump stations	\$400,000.00
2)	4 pump stations	\$400,000.00
3)	3 pump stations	\$300,000.00

D. Wetland Rehabilitation

- 1) Assume \$200,000 every 15 years
- 2) Assume \$200,000 every 15 years
- 3) No wetland

E. Grinder Pump Maintenance

1)	Assume \$50/yr per pump	\$5,000.00
2)	Assume \$50/yr per pump	\$5,000.00
3)	Assume \$50/yr per pump	\$5,000.00

F. Subsurface Disposal Rehab

- 1) No subsurface
- 2) \$400,000 every 20 years
- 3) No subsurface

G. Grinder Pump Replacement

- 1) \$1,500 replacement every 20 years
- 2) \$1,500 replacement every 20 years
- 3) \$1,500 replacement every 20 years

Based on the assumption listed above, the total present work for each alternative is as follows:

1) Constructed wetland to Hudson River discharge	\$17,477,010.00
2) Constructed wetland to subsurface discharge	\$18,079,292.00
3) Tertiary treatment to Saw Kill discharge	\$19,268,268.00

The analysis indicates the least cost alternative in the long run is to discharge to the Hudson River with primary treatment and a constructed wetland as the treatment scheme.

The detailed present worth analyses are included in Appendix B.

Risk

The collection system design carries with it very little risk. The multiple pump stations and force mains could cause odor problems initially until the flow increases but the pump stations will be designed with chemical addition capabilities intended to control any odor problems.

The treatment technologies are well established to treat the sewage to produce an effluent which meets the standards set for the Saw Kill or the Hudson River. The treatment plant will be the most energy intensive alternative and will require the most maintenance. The treatment plant to discharge to the Hudson River will be less expensive to build and to operate than the one designed to discharge to the Saw Kill.

The constructed wetland/subsurface disposal alternative carries with it substantial risk. Constructed wetlands are not well proven in New York State. As a living entity the wetland performance is going to vary to a far greater extent than the treatment plant performance. For this reason the constructed wetland is not a viable alternative for discharge to the Saw Kill.

The subsurface disposal portion will be larger than any that we know of and larger than NYSDEC recommends. There is no reason why the concept will not work given suitable soils and depth of groundwater. However, subsurface disposal systems typically need replacement every 20 - 30 years. If the land above the disposal system is used for playing fields a failure could result in the fields having to be taken out of service. The impact this may have on the community could be substantial in terms of disrupting childrens sports programs.

The pipeline to the river carries with it very little risk. Once in place it carries with it a life expectancy of at least 50 years. If standards change in the future for effluent discharge to the river, treatment can be added to discharge from the wetland.

## **CONCLUSIONS AND RECOMMENDATIONS**

The proposed sewer district for the Village/Town of Red Hook appears to be feasible depending on the costs that the commercial property owners are willing to bear.

The choice of treatment/discharge location should be deferred until the availability of land is verified and soil borings are taken on potential parcels for subsurface disposal.

In our opinion options that result in a discharge to the Hudson River offer the proposed district the best long term solution. While the subsurface disposal option is very interesting, the pipeline to the river offers a predictably longer life than the subsurface disposal option at the same or lower cost.

The discharge to the Saw Kill is the least capital cost option but it will cost more to operate and could face considerable opposition.

Our recommendation is for the District to pursue the treatment option using primary settling, a constructed wetland and a discharge to the Hudson River. We also recommend that developers of the north and south development areas be allowed to

install their off-site sewers prior to the development of the District for the core of the Village. This will ensure that the costs for the District are kept as low as possible.

Prior to making the final decision, soil borings and testing should be done at any location being considered for subsurface disposal. Wetland delineation should be performed in order to determine what lands are suitable for use as subsurface disposal or construction wetlands.

It would also be advisable to determine the availability of lands as it could be the deciding factor between the treatment options.

#### **ACKNOWLEDGEMENT**

C.T. Male Associates, P.C. wishes to thank the staff and elected officials of both the Village and Town of Red Hook for assistance in the preparation of this study.

Respectfully submitted,

C.T. MALE ASSOCIATES, P.C.



Gary R. Male, P.E.

Managing Engineer/Principal

**APPENDIX A**  
**COST ESTIMATES**

**VILLAGE/TOWN OF RED HOOK  
PROJECT COST ESTIMATE FOR SANITARY SEWERS  
CONSTRUCTED WETLAND/HUDSON RIVER DISCHARGE**

**Sequence**

1	North Developer Portion	\$1,750,000.00
2	Village/Town District	\$3,805,000.00
3	Red Hook Schools	\$246,000.00
4	South Developer Portion	\$2,700,000.00
5	Construction Wetland/Primary Settling	\$2,200,000.00
6	Pump Station and Force Main to River	<u>\$2,640,000.00</u>

Estimated Total Project Cost: \$13,341,000.00

**VILLAGE/TOWN OF RED HOOK  
PROJECT COST ESTIMATE FOR SANITARY SEWERS  
CONSTRUCTED WETLAND/SUBSURFACE DISPOSAL**

**Sequence**

1	North Developer Portion	\$1,750,000.00
2	Village/Town District	\$3,805,000.00
3	Red Hook Schools	\$246,000.00
4	South Developer Portion	\$2,700,000.00
5	Primary Settling & Constructed Wetland	\$2,200,000.00
6	Subsurface Disposal	<u>\$2,920,000.00</u>
	Estimate Total Project Cost:	\$13,621,000.00

**VILLAGE/TOWN OF RED HOOK  
PROJECT COST ESTIMATE FOR SANITARY SEWERS  
TERTIARY TREATMENT/ SAW KILL DISCHARGE**

**Sequence**

1	North Developer Portion	\$1,750,000.00
2	Village/Town District	\$3,805,000.00
3	Red Hook Schools	\$246,000.00
4	South Developer Portion	\$2,700,000.00
5	Sewage Treatment Plant (Discharge to Saw Kill)	<u>\$3,575,000.00</u>

Estimated Total Project Cost: \$12,076,000.00

**VILLAGE/TOWN OF RED HOOK  
PRELIMINARY COST ESTIMATE  
PUMP TO HUDSON RIVER**

12" Force Main			
	4,500 lf @	\$70.00 lf	\$315,000.00
12" Gravity Sewer (Effluent Sewer)			
	8,200 lf @	\$75.00 lf	\$615,000.00
Discharge into River			
	300 lf @	\$500.00 lf	\$150,000.00
24" Bored Casing			
	125 lf @	\$500.00 lf	\$62,500.00
Crushed Stone Bedding			
	1,300 cy @	\$28.00 cy	\$36,400.00
Pipe Zone Backfill			
	1,300 cy @	\$16.00 cy	\$20,800.00
Sanitary Manhole			
	10 ea	\$3,000.00 ea	\$30,000.00
Restoration			
	Lump Sum		\$100,000.00
Rock Excavation			
	500 cy @	\$200.00 cy	\$100,000.00
Sewage Pumping Station			
	Lump Sum		<u>\$500,000.00</u>
			\$1,929,700.00
	Contingency (20%):		\$386,800.00
	Soil Borings:		\$10,000.00
	Design:		\$125,000.00
	Survey:		\$30,000.00
	Contract Administration:		\$40,000.00
	Construction Observation:		\$112,500.00
	Easement Preparation:		<u>\$6,000.00</u>
			\$2,640,000.00

**VILLAGE/TOWN OF RED HOOK  
PRELIMINARY COST ESTIMATE  
FREE WATER SURFACE CONSTRUCTED WETLAND**

Wetland			
	8 acres @	\$75,000.00 /acre	\$600,000.00
Land Cost			
	12 acres @	\$40,000.00 /acre	\$480,000.00
Primary Clarification			
	2 ea @	\$100,000.00 /ea	\$200,000.00
Sludge Digestion			
	1 ea @	\$150,000.00 /ea	\$150,000.00
Control, Chemical & Aeration Building			
	1 ea @	\$175,000.00 /ea	\$175,000.00
Headworks			
	1 ea @	\$50,000.00 /ea	\$50,000.00
			\$1,655,000.00
		Contingency:	\$250,000.00
		Survey:	\$4,500.00
		Design (10%)	\$170,000.00
		Contract Administration:	\$50,000.00
		Construction Observation (100 days @ \$700/day)	\$70,000.00
		Subtotal:	\$2,200,000.00

**VILLAGE/TOWN OF RED HOOK  
PRELIMINARY COST ESTIMATE  
350,000 GPD SUBSURFACE DISPOSAL SYSTEM**

Loading Rate: 1.2 g/day/sf

Area Required: Initial field - 291,700 sf

50% Reserve Area: 145,850  
437,550 sf

**Area Required: Say 450,000 sf = 10.33 acres**

Mobilization & Demobilization	Lump Sum		\$100,000.00
Stone:	11,200 cy @	\$30.00 cy	\$336,000.00
Filter Fabric:	350' x 860'9 = 33,450 sy @	\$1.50/sy	\$50,175.00
Earthwork:	40,000 cy @	\$8.00 cy	\$320,000.00
Pipe:	65,000 lf @	\$5.00 lf	\$325,000.00
Seeding:	300 msf @	\$450.00 msf	\$135,000.00
Erosion Control:	2,500 lf @	\$3.00 lf	\$7,500.00
Control Building:			\$200,000.00
Effluent Pumping Station	Lump Sum		<u>\$400,000.00</u>

Construction Cost: \$1,873,675.00

Contingency: (20%): \$374,325.00

\$2,248,000.00

Soil Borings: \$10,000.00

Land Cost 11 x 40,000: \$440,000.00

Design: \$112,000.00

Survey: \$5,000.00

Contract Administration: \$30,000.00

Construction Observation: \$75,000.00

Estimate of Project Costs: \$2,920,000.00

**ESTIMATED PROJECT COST  
CONVENTIONAL WASTEWATER TREATMENT PLANT  
350,000 GPD**

Wastewater Treatment Plant		
350,000 gpd x	\$7.00 /gallon	\$2,450,000.00
Access Road		
2,500 @		\$100,000.00
Extension of Power		
Lump Sum		\$50,000.00
Site Fencing		
500 lf @	\$25.00 /lf	\$12,500.00
		<u>\$2,612,500.00</u>

Contingency:	\$388,500.00
Engineering Design:	\$265,000.00
Survey:	\$5,000.00
Boundary Survey:	\$3,000.00
Land Purchase:	\$50,000.00
Contract Administration:	\$50,000.00
Construction Observation:	
\$700 x 180 days:	\$126,000.00
Temporary Financing:	<u>\$75,000.00</u>
	\$3,575,000.00

C.T. MALE ASSOCIATES, P.C.

ESTIMATE OF PROJECT COST- NORTH END OF VILLAGE,WITH PRESSURE SYSTEM-PHASE 1  
 VILLAGE OF RED HOOK/TOWN OF RED HOOK  
 RED HOOK, DUTCHESS COUNTY, NEW YORK

Item No.	Item Description	Contract Quantity	Units	Unit Price	Total Amount
	Mobilization and Demobilization	1	ls	\$40,000.00	\$40,000.00
	Maintenance and Protection of Traffic	1	ls	\$5,000.00	\$5,000.00
	Construction Photographs	10	ea	\$10.00	\$100.00
	Site Preparation	1	ls	\$40,000.00	\$40,000.00
	Test Pits	20	cy	\$40.00	\$800.00
	Bedding-Crushed Stone	375	cy	\$28.00	\$10,500.00
	Pipe Zone Backfill-Sand	375	cy	\$14.00	\$5,250.00
	Special Trench Backfill	50	cy	\$14.00	\$700.00
	Highway Subbase-NYS DOT Type 2	120	cy	\$28.00	\$3,360.00
	Ashpalt Concrete Pavement Type 3,3" Thick	70	ton	\$125.00	\$8,750.00
	Misc Asphalt Type 6,All Thicknesses		ton	\$150.00	\$0.00
	8" PVC Sewer Pipe-0'-8' Depth		lf	\$50.00	\$0.00
	8" PVC Sewer Pipe-8'-12' Depth		lf	\$55.00	\$0.00
	8" PVC Sewer Pipe-12'-16' Depth		lf	\$60.00	\$0.00
	8"PVC Sewer Pipe -16'-20' Depth		lf	\$80.00	\$0.00
	8" PVC Sewer Pipe-20' Depth and over		lf	\$120.00	\$0.00
	10" PVC Sewer Pipe, 0'-8' Depth	230	lf	\$55.00	\$12,650.00
	10" PVC Sewer Pipe-8'-12' Depth	600	lf	\$60.00	\$36,000.00
	10" PVC Sewer Pipe,12-16' Depth	600	lf	\$70.00	\$42,000.00
	10" PVC Sewer Pipe,16'-20' Depth	400	lf	\$85.00	\$34,000.00
	10 " PVC Sewer Pipe,20' Depth and over	400	lf	\$125.00	\$50,000.00
	12" PVC Sewer Pipe,0'-8' Depth	150	lf	\$60.00	\$9,000.00
	12" PVC Sewer Pipe,8'-12' Depth	150	lf	\$70.00	\$10,500.00
	12" PVC Sewer Pipe,12'-16' Depth		lf	\$90.00	\$0.00
	10"x6" Wye Branches	20	ea	\$70.00	\$1,400.00
	8"x6" Wye Branches	0	ea	\$55.00	\$0.00
	6" PVC Sewer Lateral,all depths	600	ea	\$40.00	\$24,000.00
	6" Force Main (from Fisk Street PS)		lf	\$45.00	\$0.00
	12" Force Main		lf	\$70.00	\$0.00
	12" PVC Force Main(from Linden Ave PS)	3,490	lf	\$70.00	\$244,300.00
	1 1/4" Force Main		lf	\$50.00	\$0.00
	1 1/2" Force main		lf	\$55.00	\$0.00

C.T. MALE ASSOCIATES, P.C.

Item No.	Item Description	Contract Quantity	Units	Unit Price	Total Amount
	2" Force main		lf	\$60.00	\$0.00
	2 1/2" Force main		lf	\$65.00	\$0.00
	3 " Force main		lf	\$70.00	\$0.00
	24" Jacked or Bored Steel Casing		lf	\$450.00	\$0.00
	4'-Diameter Manhole (0-8' depth)	4	ea	\$2,400.00	\$9,600.00
	4'-Diameter Manhole (8'-12' depth)	4	ea	\$2,800.00	\$11,200.00
	4'-Diameter Manhole (12'-16' depth)	2	ea	\$2,800.00	\$5,600.00
	4'-Diameter Manhole (16'-20' depth)	2	ea	\$3,200.00	\$6,400.00
	4'-Diameter Manhole (20'+ depth)		ea	\$3,600.00	\$0.00
	Rock Excavation	5	cy	\$200.00	\$1,000.00
	Pump Station (S.W. Pump Sta.-500 gpm)		ea	\$600,000.00	\$0.00
	Pump Sta (Fisk Street)		ea	\$400,000.00	\$0.00
	Pump Station (Linden Avenue-750 gpm)	1	ea	\$650,000.00	\$650,000.00
	Individual Grinder Pumps		ea	\$2,750.00	\$0.00
	Short side grinder connections		ea	\$1,500.00	\$0.00
	Long side grinder connections		ea	\$3,000.00	\$0.00
	Sidewalk Panel Replacement		ea	\$300.00	\$0.00
	Topsoil and Fertilizer		msf	\$200.00	\$0.00
	Lawn Seeding		msf	\$200.00	\$0.00
	Perennial Rye Seeding	20	msf	\$150.00	\$3,000.00
	Restoration	1	ls	\$20,000.00	\$20,000.00
	Construction Stakeout	1	ls	\$5,000.00	\$5,000.00
	Easement Stakeout		ls		\$0.00
	Environmental Protection	1	ls	\$15,000.00	\$15,000.00
	Stream Crossings	2	ea	\$20,000.00	\$40,000.00
	<b>TOTAL ESTIMATED CONSTRUCTION COST</b>				<b>\$1,345,110.00</b>
				Contingencies (15%):	\$202,590.00
				Engineering Reports:	
				Design Survey:	\$10,000.00
				Design(6%):	\$81,300.00
				Easements- 0 @ \$500/ea:	\$2,000.00
				Legal:	\$4,000.00
				Temporary Financing:	\$60,000.00
				Contract Administration:	\$10,000.00
				\$50.00 s @ \$700/day:	\$35,000.00
				Fee Land Purchase:	
				<b>TOTAL PROJECT COST - PIPELINE PORTION:</b>	<b>\$1,750,000.00</b>

C.T. MALE ASSOCIATES, P.C.

Item No.	Item Description	Contract Quantity	Units	Unit Price	Total Amount

**ESTIMATE OF PROJECT COST-GRAVITY AND PRESSURE SEWER TO NORTH  
VILLAGE OF RED HOOK/TOWN OF RED HOOK  
RED HOOK, DUTCHESS COUNTY, NEW YORK**

Item No	Item Description	Contract Quantity	Units	Unit Price	Total Amount
	Mobilization and Demobilization	1	ls	\$40,000.00	\$40,000.00
	Maintenance and Protection of Traffic	1	ls	\$25,000.00	\$25,000.00
	Construction Photographs	200	ea	\$10.00	\$2,000.00
	Site Preparation	1	ls	\$20,000.00	\$20,000.00
	Test Pits	200	cy	\$40.00	\$8,000.00
	Bedding-Crushed Stone	700	cy	\$28.00	\$19,600.00
	Pipe Zone Backfill-Sand	400	cy	\$14.00	\$5,600.00
	Special Trench Backfill	200	cy	\$14.00	\$2,800.00
	Highway Subbase-NYS DOT Type 2	500	cy	\$28.00	\$14,000.00
	Ashpalt Concrete Pavement Type 3,3" Thick	140	ton	\$125.00	\$17,500.00
	Misc Asphalt Type 6,All Thicknesses	50	ton	\$150.00	\$7,500.00
	8" PVC Sewer Pipe-0'-8' Depth	2,000	lf	\$50.00	\$100,000.00
	8" PVC Sewer Pipe-8'-12' Depth	3,505	lf	\$55.00	\$192,775.00
	8" PVC Sewer Pipe-12'-16' Depth	1,000	lf	\$60.00	\$60,000.00
	8"PVC Sewer Pipe -16'-20' Depth		lf	\$80.00	\$0.00
	8" PVC Sewer Pipe-20' Depth and over		lf	\$120.00	\$0.00
	10" PVC Sewer Pipe, 0'-8' Depth		lf	\$55.00	\$0.00
	10" PVC Sewer Pipe-8'-12' Depth		lf	\$60.00	\$0.00
	10" PVC Sewer Pipe,12-16' Depth		lf	\$70.00	\$0.00
	10" PVC Sewer Pipe,16'-20' Depth		lf	\$85.00	\$0.00
	10 " PVC Sewer Pipe,20' Depth and over		lf	\$125.00	\$0.00
	12" PVC Sewer Pipe,0'-8' Depth	850	lf	\$60.00	\$51,000.00
	12" PVC Sewer Pipe,8'-12' Depth	450	lf	\$70.00	\$31,500.00
	12" PVC Sewer Pipe,12'-16' Depth	412	lf	\$90.00	\$37,080.00
	10"x6" Wye Branches		ea	\$70.00	\$0.00
	8"x6" Wye Branches	50	ea	\$55.00	\$2,750.00
	6" PVC Sewer Lateral,all depths	1,000	ea	\$40.00	\$40,000.00
	6" Temporary Force Main	2,300	lf	\$45.00	\$103,500.00
	8" Force Main (from Fisk Street PS)	3,900	lf	\$80.00	\$312,000.00
	12" Force Main		lf	\$125.00	\$0.00
	12" PVC Force Main(from Linden Ave PS)		lf	\$65.00	\$0.00
	1 1/4" Force Main	400	lf	\$50.00	\$20,000.00

C.T. MALE ASSOCIATES, P.C.

Item No.	Item Description	Contract Quantity	Units	Unit Price	Total Amount	
	1 1/2" Force main	400	lf	\$55.00	\$22,000.00	
	2" Force main	400	lf	\$60.00	\$24,000.00	
	2 1/2" Force main	400	lf	\$65.00	\$26,000.00	
	3 " Force main	1,000	lf	\$70.00	\$70,000.00	
	4" Force main		lf	\$75.00	\$0.00	
	24" Jacked or Bored Steel Casing	450	lf	\$450.00	\$202,500.00	
	4'-Diameter Manhole (0-8' depth)	23	ea	\$2,000.00	\$46,000.00	
	4'-Diameter Manhole (8'-12' depth)	18	ea	\$2,400.00	\$43,200.00	
	4'-Diameter Manhole (12'-16' depth)	8	ea	\$2,800.00	\$22,400.00	
	4'-Diameter Manhole (16'-20' depth)		ea	\$3,200.00	\$0.00	
	4'-Diameter Manhole (20'+ depth)		ea	\$3,600.00	\$0.00	
	Rock Excavation	20	cy	\$200.00	\$4,000.00	
	Pump Station (S.W. Pump Sta.-500 gpm)		ea		\$0.00	
	Pump Sta (Fisk Street PS)	1	ea	\$300,000.00	\$300,000.00	
	Pump Station (Linden Avenue-750 gpm)		ea		\$0.00	
	Temporary Pump Station	1	ea	\$200,000.00	\$200,000.00	
	Individual Grinder Pumps	99	ea	\$2,750.00	\$272,250.00	
	Short side grinder connections	49	ea	\$1,500.00	\$73,500.00	
	Long side grinder connections	50	ea	\$3,000.00	\$150,000.00	
	Sidewalk Panel Replacement	99	ea	\$300.00	\$29,700.00	
	Topsoil and Fertilizer	40	msf	\$200.00	\$8,000.00	
	Lawn Seeding	40	msf	\$200.00	\$8,000.00	
	Perrenial Rye Seeding	5	msf	\$150.00	\$750.00	
	Restoration	1	ls	\$50,000.00	\$50,000.00	
	Construction Stakeout	1	ls	\$20,000.00	\$20,000.00	
	Easement Stakeout	1	ls	\$10,000.00	\$10,000.00	
	Environmental Protection	1	ls	\$50,000.00	\$50,000.00	
	TOTAL ESTIMATED CONSTRUCTION COST					\$2,744,905.00
				Contingencies (15%):	\$410,095.00	
				Engineering Reports:	\$40,000.00	
				Design Survey:	\$40,000.00	
				Design(6%):	\$165,000.00	
				Easements -20@ \$500/ea:	\$10,000.00	
				Legal:	\$20,000.00	
				Temporary Financing:	\$200,000.00	
				Contract Administration:	\$40,000.00	
				Construction Observation - 150 days @ \$700/day:	\$105,000.00	
				Fee Land Purchase:	\$30,000.00	



**ESTIMATE OF PROJECT COST- SEWER SYSTEM-RED HOOK SCHOOLS  
VILLAGE OF RED HOOK/TOWN OF RED HOOK  
RED HOOK, DUTCHESS COUNTY, NEW YORK**

Item No.	Item Description	Contract Quantity	Units	Unit Price	Total Amount
	Mobilization and Demobilization	1	ls	\$10,000.00	\$10,000.00
	Maintenance and Protection of Traffic		ls		\$0.00
	Construction Photographs	20	ea	\$10.00	\$200.00
	Site Preparation	1	ls	\$5,000.00	\$5,000.00
	Test Pits	10	cy	\$40.00	\$400.00
	Bedding-Crushed Stone	200	cy	\$28.00	\$5,600.00
	Pipe Zone Backfill-Sand	200	cy	\$14.00	\$2,800.00
	Special Trench Backfill		cy	\$14.00	\$0.00
	Highway Subbase-NYS DOT Type 2	10	cy	\$28.00	\$280.00
	Ashpalt Concrete Pavement Type 3,3" Thick	10	ton	\$125.00	\$1,250.00
	Misc Asphalt Type 6,All Thicknesses	10	ton	\$150.00	\$1,500.00
	8" PVC Sewer Pipe-0'-8' Depth	1,140	lf	\$50.00	\$57,000.00
	8" PVC Sewer Pipe-8'-12' Depth	1,000	lf	\$55.00	\$55,000.00
	8" PVC Sewer Pipe-12'-16' Depth		lf	\$60.00	\$0.00
	8"PVC Sewer Pipe -16'-20' Depth		lf	\$80.00	\$0.00
	8" PVC Sewer Pipe-20' Depth and over		lf	\$120.00	\$0.00
	10" PVC Sewer Pipe, 0'-8' Depth		lf	\$55.00	\$0.00
	10" PVC Sewer Pipe-8'-12' Depth		lf	\$60.00	\$0.00
	10" PVC Sewer Pipe,12-16' Depth		lf	\$70.00	\$0.00
	10" PVC Sewer Pipe,16'-20' Depth		lf	\$85.00	\$0.00
	10 " PVC Sewer Pipe,20' Depth and over		lf	\$125.00	\$0.00
	12" PVC Sewer Pipe,0'-8' Depth		lf	\$60.00	\$0.00
	12" PVC Sewer Pipe,8'-12' Depth		lf	\$70.00	\$0.00
	12" PVC Sewer Pipe,12'-16' Depth		lf	\$90.00	\$0.00
	10"x6" Wye Branches		ea	\$70.00	\$0.00
	8"x6" Wye Branches	3	ea	\$55.00	\$165.00
	6" PVC Sewer Lateral,all depths	45	ea	\$40.00	\$1,800.00
	6" Force Main (from Fisk Street PS)		lf	\$45.00	\$0.00
	12" Force Main		lf	\$70.00	\$0.00
	12" PVC Force Main(from Linden Ave PS)		lf	\$70.00	\$0.00
	1 1/4" Force Main		lf	\$50.00	\$0.00
	1 1/2" Force main		lf	\$55.00	\$0.00

C.T. MALE ASSOCIATES, P.C.

Item No.	Item Description	Contract Quantity	Units	Unit Price	Total Amount
	2" Force main		lf	\$60.00	\$0.00
	2 1/2" Force main		lf	\$65.00	\$0.00
	3 " Force main		lf	\$70.00	\$0.00
	24" Jacked or Bored Steel Casing		lf	\$450.00	\$0.00
	4'-Diameter Manhole (0-8' depth)	5	ea	\$2,400.00	\$12,000.00
	4'-Diameter Manhole (8'-12' depth)	5	ea	\$2,800.00	\$14,000.00
	4'-Diameter Manhole (12'-16' depth)		ea	\$2,800.00	\$0.00
	4'-Diameter Manhole (16'-20' depth)		ea	\$3,200.00	\$0.00
	4'-Diameter Manhole (20'+ depth)		ea	\$3,600.00	\$0.00
	Rock Excavation	5	cy	\$200.00	\$1,000.00
	Pump Station (S.W. Pump Sta.-500 gpm)		ea	\$600,000.00	\$0.00
	Pump Sta (Fisk Street)		ea	\$400,000.00	\$0.00
	Pump Station (Linden Avenue-750 gpm)		ea	\$650,000.00	\$0.00
	Individual Grinder Pumps		ea	\$2,750.00	\$0.00
	Short side grinder connections		ea	\$1,500.00	\$0.00
	Long side grinder connections		ea	\$3,000.00	\$0.00
	Sidewalk Panel Replacement		ea	\$300.00	\$0.00
	Topsoil and Fertilizer	35	msf	\$200.00	\$7,000.00
	Lawn Seeding	35	msf	\$200.00	\$7,000.00
	Perennial Rye Seeding	30	msf	\$150.00	\$4,500.00
	Restoration	1	ls	\$5,000.00	\$5,000.00
	Construction Stakeout	1	ls	\$1,500.00	\$1,500.00
	Easement Stakeout		ls		\$0.00
	Environmental Protection		ls	\$2,000.00	\$0.00
	<b>TOTAL ESTIMATED CONSTRUCTION COST</b>				<b>\$192,995.00</b>
				Contingencies (15%):	\$29,705.00
				Engineering Reports:	
				Design Survey:	\$1,800.00
				Design(6%):	\$11,000.00
				Easements-2@ \$500/ea:	\$1,000.00
				Legal:	
				Temporary Financing:	\$5,000.00
				Contract Administration:	\$1,000.00
				Construction Observation -5days @ \$700/day:	\$3,500.00
				Fee Land Purchase:	
	<b>TOTAL PROJECT COST - PIPELINE PORTION:</b>				<b>\$246,000.00</b>

C.T. MALE ASSOCIATES, P.C.

Item No.	Item Description	Contract Quantity	Units	Unit Price	Total Amount

**ESTIMATE OF PROJECT COST- SEWER SYSTEM FOR SOUTH DEV./WEST SIDE  
VILLAGE OF RED HOOK/TOWN OF RED HOOK  
RED HOOK, DUTCHESS COUNTY, NEW YORK**

Item No.	Item Description	Contract Quantity	Units	Unit Price	Total Amount
	Mobilization and Demobilization	1	ls	\$40,000.00	\$40,000.00
	Maintenance and Protection of Traffic	1	ls	\$5,000.00	\$5,000.00
	Construction Photographs	10	ea	\$10.00	\$100.00
	Site Preparation	1	ls	\$5,000.00	\$5,000.00
	Test Pits	10	cy	\$40.00	\$400.00
	Bedding-Crushed Stone	400	cy	\$28.00	\$11,200.00
	Pipe Zone Backfill-Sand	200	cy	\$14.00	\$2,800.00
	Special Trench Backfill	100	cy	\$14.00	\$1,400.00
	Highway Subbase-NYS DOT Type 2	1,500	cy	\$28.00	\$42,000.00
	Ashpalt Concrete Pavement Type 3,3" Thick	600	ton	\$125.00	\$75,000.00
	Misc Asphalt Type 6,All Thicknesses	70	ton	\$150.00	\$10,500.00
	8" PVC Sewer Pipe-0'-8' Depth	2,000	lf	\$50.00	\$100,000.00
	8" PVC Sewer Pipe-8'-12' Depth	2,540	lf	\$55.00	\$139,700.00
	8" PVC Sewer Pipe-12'-16' Depth		lf	\$60.00	\$0.00
	8"PVC Sewer Pipe -16'-20' Depth		lf	\$80.00	\$0.00
	8" PVC Sewer Pipe-20' Depth and over		lf	\$120.00	\$0.00
	10" PVC Sewer Pipe, 0'-8' Depth	1,225	lf	\$55.00	\$67,375.00
	10" PVC Sewer Pipe-8'-12' Depth	1,000	lf	\$60.00	\$60,000.00
	10" PVC Sewer Pipe,12-16' Depth		lf	\$70.00	\$0.00
	10" PVC Sewer Pipe,16'-20' Depth		lf	\$85.00	\$0.00
	10 " PVC Sewer Pipe,20' Depth and over		lf	\$125.00	\$0.00
	12" PVC Sewer Pipe,0'-8' Depth		lf	\$60.00	\$0.00
	12" PVC Sewer Pipe,8'-12' Depth		lf	\$70.00	\$0.00
	12" PVC Sewer Pipe,12'-16' Depth		lf	\$90.00	\$0.00
	10"x6" Wye Branches	12	ea	\$70.00	\$840.00
	8"x6" Wye Branches	80	ea	\$55.00	\$4,400.00
	6" PVC Sewer Lateral,all depths	2,760	ea	\$40.00	\$110,400.00
	6" Force Main (from Fisk Street PS)		lf	\$45.00	\$0.00
	12" Force Main	6,880	lf	\$70.00	\$481,600.00
	12" PVC Force Main(from Linden Ave PS)		lf	\$70.00	\$0.00
	1 1/4" Force Main		lf	\$50.00	\$0.00
	1 1/2" Force main		lf	\$55.00	\$0.00

C.T. MALE ASSOCIATES, P.C.

Item No.	Item Description	Contract Quantity	Units	Unit Price	Total Amount
	2" Force main		lf	\$60.00	\$0.00
	2 1/2" Force main		lf	\$65.00	\$0.00
	3 " Force main		lf	\$70.00	\$0.00
	24" Jacked or Bored Steel Casing	75	lf	\$450.00	\$33,750.00
	4'-Diameter Manhole (0-8' depth)	26	ea	\$2,400.00	\$62,400.00
	4'-Diameter Manhole (8'-12' depth)	19	ea	\$2,800.00	\$53,200.00
	4'-Diameter Manhole (12'-16' depth)		ea	\$2,800.00	\$0.00
	4'-Diameter Manhole (16'-20' depth)		ea	\$3,200.00	\$0.00
	4'-Diameter Manhole (20'+ depth)		ea	\$3,600.00	\$0.00
	Rock Excavation	5	cy	\$200.00	\$1,000.00
	Pump Station (S.W. Pump Sta.-500 gpm)	1	ea	\$600,000.00	\$600,000.00
	Pump Sta (Fisk Street)		ea	\$400,000.00	\$0.00
	Pump Station (Linden Avenue-750 gpm)		ea	\$650,000.00	\$0.00
	Individual Grinder Pumps		ea	\$2,750.00	\$0.00
	Short side grinder connections		ea	\$1,500.00	\$0.00
	Long side grinder connections		ea	\$3,000.00	\$0.00
	Sidewalk Panel Replacement		ea	\$300.00	\$0.00
	Topsoil and Fertilizer	80	msf	\$200.00	\$16,000.00
	Lawn Seeding	80	msf	\$200.00	\$16,000.00
	Perennial Rye Seeding		msf	\$150.00	\$0.00
	Restoration	1	ls	\$75,000.00	\$75,000.00
	Construction Stakeout		ls	\$5,000.00	\$0.00
	Easement Stakeout	1	ls	\$5,000.00	\$5,000.00
	Environmental Protection	1	ls	\$25,000.00	\$25,000.00
	<b>TOTAL ESTIMATED CONSTRUCTION COST</b>				<b>\$2,045,065.00</b>
				Contingencies (15%):	\$309,235.00
				Engineering Reports:	\$10,000.00
				Design Survey:	\$15,000.00
				Design(6%):	\$122,700.00
				Easements - 26 @ \$500/ea:	\$13,000.00
				Legal:	\$25,000.00
				Temporary Financing:	\$60,000.00
				Contract Administration:	\$30,000.00
				Construction Observation - 100days @ \$700/day:	\$70,000.00
				Fee Land Purchase:	
				<b>TOTAL PROJECT COST - PIPELINE PORTION:</b>	<b>\$2,700,000.00</b>

C.T. MALE ASSOCIATES, P.C.

Item No.	Item Description	Contract Quantity	Units	Unit Price	Total Amount

**APPENDIX B**  
**PRESENT WORTH ANALYSES**

## Alternative: Constructed Wetland with Hudson River Discharge

1. Construction Cost: \$13,341,000 Present Value

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2. Annual Operational Cost: \$150,000 Yearly Present Value

All costs inflated 3% per year, then brought back to present value at 5% value of money over 30 year period.

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
0	\$150,000	
1	\$154,500	\$147,143
2	\$159,135	\$144,340
3	\$163,909	\$141,591
4	\$168,826	\$138,894
5	\$173,891	\$136,248
6	\$179,108	\$133,653
7	\$184,481	\$131,107
8	\$190,016	\$128,610
9	\$195,716	\$126,160
10	\$201,587	\$123,757
11	\$207,635	\$121,400
12	\$213,864	\$119,088
13	\$220,280	\$116,819
14	\$226,888	\$114,594
15	\$233,695	\$112,411
16	\$240,706	\$110,270
17	\$247,927	\$108,170
18	\$255,365	\$106,109
19	\$263,026	\$104,088
20	\$270,917	\$102,106
21	\$279,044	\$100,161
22	\$287,416	\$98,253
23	\$296,038	\$96,381
24	\$304,919	\$94,546
25	\$314,067	\$92,745
26	\$323,489	\$90,978
27	\$333,193	\$89,245
28	\$343,189	\$87,545
29	\$353,485	\$85,878
30	\$364,089	\$84,242

Present Worth Operational Cost: \$3,386,533

---

3. Pump Station Rehabilitation: \$400,000

Pump station maintenance occurs every 20 years (year 20)

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
20	\$722,444	\$272,282

**Present Worth of Pump Station Rehabilitation: \$272,282**

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4. Wetland Rehabilitation: \$200,000

Rehabilitation of the constructed wetlands occurs every 15 years (Year 15 and 30)

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
15	\$311,593	\$149,882
30	\$485,452	\$112,323

**Present Worth Wetland Rehabilitation: \$262,205**

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5. Grinder Pump Maintenance Cost: \$5,000 Yearly Present Value

Maintenance cost is \$50/year per pump (99 pumps total)

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
0	\$5,000	
1	\$5,150	\$4,905
2	\$5,305	\$4,811
3	\$5,464	\$4,720
4	\$5,628	\$4,630
5	\$5,796	\$4,542
6	\$5,970	\$4,455
7	\$6,149	\$4,370
8	\$6,334	\$4,287
9	\$6,524	\$4,205
10	\$6,720	\$4,125
11	\$6,921	\$4,047
12	\$7,129	\$3,970
13	\$7,343	\$3,894
14	\$7,563	\$3,820
15	\$7,790	\$3,747
16	\$8,024	\$3,676
17	\$8,264	\$3,606

18	\$8,512	\$3,537
19	\$8,768	\$3,470
20	\$9,031	\$3,404
21	\$9,301	\$3,339
22	\$9,581	\$3,275
23	\$9,868	\$3,213
24	\$10,164	\$3,152
25	\$10,469	\$3,091
26	\$10,783	\$3,033
27	\$11,106	\$2,975
28	\$11,440	\$2,918
29	\$11,783	\$2,863
30	\$12,136	\$2,808

**Present Worth Grinder Pump Maintenance Cost: \$112,884**

---

6. Grinder Pump Replacement Cost: \$150,000

Grinder pump replacement occurs every 20 years (year 20) and is \$1,500 per pump

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
20	\$270,917	\$102,106

**Present Worth of Grinder Pump Replacement: \$102,106**

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**Total Present Worth: \$17,477,010**

## Alternative: Constructed Wetland with Subsurface Discharge

1. Construction Cost: \$13,621,000 Present Value

---

2. Annual Operational Cost: \$150,000 Yearly Present Value

All costs inflated 3% per year, then brought back to present value at 5% value of money over 30 year period.

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
0	\$150,000	
1	\$154,500	\$147,143
2	\$159,135	\$144,340
3	\$163,909	\$141,591
4	\$168,826	\$138,894
5	\$173,891	\$136,248
6	\$179,108	\$133,653
7	\$184,481	\$131,107
8	\$190,016	\$128,610
9	\$195,716	\$126,160
10	\$201,587	\$123,757
11	\$207,635	\$121,400
12	\$213,864	\$119,088
13	\$220,280	\$116,819
14	\$226,888	\$114,594
15	\$233,695	\$112,411
16	\$240,706	\$110,270
17	\$247,927	\$108,170
18	\$255,365	\$106,109
19	\$263,026	\$104,088
20	\$270,917	\$102,106
21	\$279,044	\$100,161
22	\$287,416	\$98,253
23	\$296,038	\$96,381
24	\$304,919	\$94,546
25	\$314,067	\$92,745
26	\$323,489	\$90,978
27	\$333,193	\$89,245
28	\$343,189	\$87,545
29	\$353,485	\$85,878
30	\$364,089	\$84,242

Present Worth Operational Cost: \$3,386,533

---

3. Pump Station Rehabilitation: \$400,000

Pump station rehabilitation occurs every 20 years (year 20)

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
20	\$722,444	\$272,282

**Present Worth of Pump Station Rehabilitation: \$272,282**

4. Wetland Rehabilitation: \$200,000

Rehabilitation of the constructed wetlands occurs every 15 years (Year 15 and 30)

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
15	\$311,593	\$149,882
30	\$485,452	\$112,323

**Present Worth Wetland Rehabilitation: \$262,205**

5. Subsurface Disposal Rehabilitation: \$400,000

Rehabilitation of the subsurface disposal system occurs every 20 years (year 20)

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
20	\$722,444	\$272,282

**Present Worth of Subsurface Disposal Rehab: \$272,282**

6. Grinder Pump Maintenance Cost: \$5,000 Yearly Present Value

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
0	\$5,000	
1	\$5,150	\$4,905
2	\$5,305	\$4,811
3	\$5,464	\$4,720
4	\$5,628	\$4,630
5	\$5,796	\$4,542
6	\$5,970	\$4,455

7	\$6,149	\$4,370
8	\$6,334	\$4,287
9	\$6,524	\$4,205
10	\$6,720	\$4,125
11	\$6,921	\$4,047
12	\$7,129	\$3,970
13	\$7,343	\$3,894
14	\$7,563	\$3,820
15	\$7,790	\$3,747
16	\$8,024	\$3,676
17	\$8,264	\$3,606
18	\$8,512	\$3,537
19	\$8,768	\$3,470
20	\$9,031	\$3,404
21	\$9,301	\$3,339
22	\$9,581	\$3,275
23	\$9,868	\$3,213
24	\$10,164	\$3,152
25	\$10,469	\$3,091
26	\$10,783	\$3,033
27	\$11,106	\$2,975
28	\$11,440	\$2,918
29	\$11,783	\$2,863
30	\$12,136	\$2,808

**Present Worth Grinder Pump Maintenance Cost: \$112,884**

7. Grinder Pump Replacement Cost: \$150,000

Grinder pump replacement occurs every 20 years (year 20)

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
20	\$270,917	\$102,106

**Present Worth of Grinder Pump Replacement: \$102,106**

**Total Present Worth: \$18,029,292**

## Alternative: Tertiary Treatment with Discharge to Sawkill

1. Construction Cost: **\$12,076,000** Present Value

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2. Annual Operational Cost: **\$300,000** Yearly Present Value

All costs inflated 3% per year, then brought back to present value at 5% value of money over 30 year period.

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
0	\$300,000	
1	\$309,000	\$294,286
2	\$318,270	\$288,680
3	\$327,818	\$283,182
4	\$337,653	\$277,788
5	\$347,782	\$272,496
6	\$358,216	\$267,306
7	\$368,962	\$262,215
8	\$380,031	\$257,220
9	\$391,432	\$252,321
10	\$403,175	\$247,514
11	\$415,270	\$242,800
12	\$427,728	\$238,175
13	\$440,560	\$233,638
14	\$453,777	\$229,188
15	\$467,390	\$224,823
16	\$481,412	\$220,540
17	\$495,854	\$216,340
18	\$510,730	\$212,219
19	\$526,052	\$208,177
20	\$541,833	\$204,211
21	\$558,088	\$200,322
22	\$574,831	\$196,506
23	\$592,076	\$192,763
24	\$609,838	\$189,091
25	\$628,133	\$185,490
26	\$646,977	\$181,956
27	\$666,387	\$178,491
28	\$686,378	\$175,091
29	\$706,970	\$171,756
30	\$728,179	\$168,484

**Present Worth Operational Cost: \$6,773,067**

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3. Pump Station Rehabilitation: \$300,000

Pump station rehabilitation occurs every 20 years (year 20)

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
20	\$541,833	\$204,211

**Present Worth of Pump Station Rehabilitation: \$204,211**

6. Grinder Pump Maintenance Cost: \$5,000 Yearly Present Value

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
0	\$5,000	
1	\$5,150	\$4,905
2	\$5,305	\$4,811
3	\$5,464	\$4,720
4	\$5,628	\$4,630
5	\$5,796	\$4,542
6	\$5,970	\$4,455
7	\$6,149	\$4,370
8	\$6,334	\$4,287
9	\$6,524	\$4,205
10	\$6,720	\$4,125
11	\$6,921	\$4,047
12	\$7,129	\$3,970
13	\$7,343	\$3,894
14	\$7,563	\$3,820
15	\$7,790	\$3,747
16	\$8,024	\$3,676
17	\$8,264	\$3,606
18	\$8,512	\$3,537
19	\$8,768	\$3,470
20	\$9,031	\$3,404
21	\$9,301	\$3,339
22	\$9,581	\$3,275
23	\$9,868	\$3,213
24	\$10,164	\$3,152
25	\$10,469	\$3,091
26	\$10,783	\$3,033
27	\$11,106	\$2,975
28	\$11,440	\$2,918
29	\$11,783	\$2,863
30	\$12,136	\$2,808

**Present Worth Grinder Pump Maintenance Cost: \$112,884**

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7. Grinder Pump Replacement Cost: \$150,000

Grinder pump replacement occurs every 20 years (year 20)

Year	Future Value at 3% Inflation	Present Worth 5% Value of Money
20	\$270,917	\$102,106

**Present Worth of Grinder Pump Replacement: \$102,106**

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**Total Present Worth: \$19,268,268**

**APPENDIX C**

**PROPERTIES WITHIN  
GRAVITY/PRESSURE SERVICE AREA**

PARCELS WITHIN THE  
PROPOSED SEWER DISTRICT

SBL	PRINT_KEY	CUR_LND	CUR_TOT_A	LOC_NAME	OWNER1	FRONT_F	FACRES	WATER_USE
1	00627200063747620000	6272-06-374762-0000	24500	164000 W Market St	Dominy Michele D	67.0000	0.310	8860
2	00627200063837560000	6272-06-383756-0000	22900	132000 W Market St	Trezza Gloria A	62.0000	0.260	4130
3	00627200063907520000	6272-06-390752-0000	22900	140000 W Market St	Borenstein David R	72.8000	0.260	
4	00627200064407560000	6272-06-440756-0000	24500	250000 Broadway	Verilli Richard Richar	72.0000	0.310	11320
5	00627200064407720000	6272-06-440772-0000	93200	320700 Broadway	Star Pass Lic	93.0001	0.900	13850
6	00627200064437630000	6272-06-443763-0000	23500	177000 Broadway	Golden Paula	66.9000	0.280	14380
7	00627200064517780000	6272-06-451778-0000	24100	125000 N Broadway	Nichols-Marcy Michae	98.0000	0.300	6610
8	00627200064537840000	6272-06-453784-0000	47700	111200 N Broadway	Singer Blanche P	52.1000	0.170	8740
9	00627200064567950000	6272-06-456795-0000	26000	151100 N Broadway	Cuthell Dawn Hagmar	65.0000	0.230	2800
10	00627200064617500000	6272-06-461750-0000	55800	131400 N Broadway	27 N Broadway Corp	98.0000	0.300	2090
11	00627200064707530000	6272-06-470753-0000	81100	254600 N Broadway	Keil Realty Llc	91.0001	1.000	5290
12	00627200064717760000	6272-06-471776-0000	53100	134000 N Broadway	Arsam's Inc	75.4000	0.230	25950
13	00627200064737850000	6272-06-473785-0000	53100	155600 N Broadway	Dake Bros Inc	100.0000	0.230	12080
14	00627200064787650000	6272-06-478765-0000	67500	165000 N Broadway	Baright Carleen S	101.0001	0.690	16300
15	00627200064798000000	6272-06-479800-0000	20000	141500 N Broadway	Friends Of Elmendorp	142.0001	0.470	7000
16	00627200064908160000	6272-06-490816-0000	99000	786500 N Broadway	Tiberlo Dominick	254.0001	1.100	56010
17	00627200075038400000	6272-07-503840-0000	65700	190700 N Broadway	La Morle Vito	150.0000	0.600	
18	00627200075058470000	6272-07-506847-0000	55800	120400 N Broadway	Annunziata Salvatore	75.0000	0.290	7120
19	00627200075148640000	6272-07-514864-0000	42000	133000 Broadway	Damese, LLC	150.0001	0.510	1780
20	00627200075649930000	6272-07-564993-0000	132600	516400 N Broadway	Cookingham Oakleigt	0.0000	86.230	5810
21	00627200102815040000	6272-10-281504-0000	29200	144000 S Broadway	Coston Gregory	96.0000	0.640	11050
22	00627200102855130000	6272-10-285513-0000	30000	119500 Broadway	Mc Carthy Scott B	103.0000	0.720	4420
23	00627200102865260000	6272-10-286526-0000	83700	173400 S Broadway	Varlaro Joseph G	131.0000	0.890	14330
24	00627200102895380000	6272-10-289538-0000	57900	242200 S Broadway	Cayea James G	123.0001	0.840	
25	00627200102925490000	6272-10-292549-0000	57600	207000 Broadway	Red Hook Partnership	50.0001	0.320	2730
26	00627200102995600000	6272-10-299560-0000	38000	146100 S Broadway	Fell David A	98.0001	0.650	5410
27	00627200103075600000	6272-10-307560-0000	26000	140000 S Broadway	Fell David A	60.2000	0.230	11140
28	00627200103145640000	6272-10-314564-0000	53100	148300 S Broadway	Lamic Inc	86.0001	0.250	2670
29	00627200103175120000	6272-10-317512-0000	26500	133000 S Broadway	Kuhn John D	60.0000	0.370	8370
30	00627200103185190000	6272-10-318519-0000	27600	168200 Broadway	Flachs Frank A	79.9000	0.480	3770
31	00627200103195280000	6272-10-319528-0000	28500	137000 S Broadway	Heuer Robert C	100.0000	0.570	14400
32	00627200103245030000	6272-10-324503-0000	35900	157200 S Broadway	Cohen David	110.0001	1.400	11120
33	00627200103285930000	6272-10-328593-0000	26800	110500 S Broadway	Wicks Douglas F	75.4000	0.390	2730
34	00627200103306010000	6272-10-330601-0000	26800	138000 S Broadway	Alperson Ruth	60.0000	0.400	4000
35	00627200103346060000	6272-10-334606-0000	27700	145000 S Broadway	Church Of	75.0000	0.480	6000
36	00627200103385600000	6272-10-338560-0000	28500	167500 Broadway	Willms Martin	112.0000	0.570	13460
37	00627200103436170000	6272-10-343617-0000	36900	833600 Garden St	St. Christophers Shrn	206.0001	1.300	8530
38	00627200103677370000	6272-10-367737-0000	24900	693800 W Market St	Methodist Church	270.0000	0.620	9540
39	00627200103686390000	6272-10-368639-0000	39100	510600 S Broadway	Christ Church	242.0001	1.600	4170
40	00627200103686500000	6272-10-368650-0000	26400	153000 S Broadway	Odom Ronald P	67.2000	0.360	9010
41	00627200103716560000	6272-10-371656-0000	37200	135000 S Broadway	Stokum Jeffrey	45.0000	0.360	11830
42	00627200103737360000	6272-10-373736-0000	13700	13700 Church St	Methodist Church	50.0000	0.150	10130
43	00627200103786560000	6272-10-378656-0000	17200	120000 S Broadway	Brent Glen	47.0001	0.130	8280
44	00627200103787360000	6272-10-378736-0000	18700	108900 W Market St	K D K Realty Corp	50.0000	0.150	12220
45	00627200103837290000	6272-10-383729-0000	60300	320200 W Market St	K D K Realty	100.0000	0.400	6950
46	00627200103856580000	6272-10-385658-0000	17200	135000 S Broadway	Phillips Velma W	60.0000	0.130	10330
47	00627200103856730000	6272-10-385673-0000	24900	250000 S Broadway	Savery Daniel J	119.0000	0.780	13575
48	00627200103886360000	6272-10-388636-0000	25100	155500 S Broadway	Diamond Douglas S	90.0000	0.230	4330
49	00627200103907240000	6272-10-390724-0000	31800	135000 W Market St	J D T J Land Compan	66.1000	0.290	43180
50	00627200103926860000	6272-10-392686-0000	82800	279000 S Broadway	Glek Kenneth G	131.0001	0.890	13280
51	00627200103955620000	6272-10-395562-0000	119000	1323200 S Broadway	St Pauls Lutheran	877.0001	14.960	7800
52	00627200103957180000	6272-10-395718-0000	109100	502400 W Market St	Key Bank of	104.0000	0.530	2320
53	00627200103967450000	6272-10-396745-0000	35400	283000 W Market St	Wade Joanne Grahar	110.0000	0.340	
54	00627200103986400000	6272-10-398640-0000	63000	208400 S Broadway	Seitz George W	115.0000	0.630	14260
55	00627200104037000000	6272-10-403700-0000	57800	66400 S Broadway	Key Bank of	78.0000	0.420	0
56	00627200104037460000	6272-10-403746-0000	19400	142500 W Market St	Fell David A	35.0000	0.160	4390
57	00627200104046520000	6272-10-404652-0000	32300	193200 S Broadway	Village Of Red Hook	117.0000	0.490	7110
58	00627200104046880000	6272-10-404688-0000	55000	180000 S Broadway	Village Of Red Hook	50.0000	0.140	0
59	00627200104077200000	6272-10-407720-0000	22000	22000 W Market St	Key Bank Of	88.3000	0.250	2320
60	00627200104086630000	6272-10-408663-0000	64800	132400 S Broadway	Key Insurance Agency	130.0001	0.350	2100
61	00627200104087430000	6272-10-408743-0000	87100	205900 W Market St	Christian Lodge	65.0000	0.300	28860
62	00627200104107350000	6272-10-410735-0000	30400	125200 Market St	Dillon John	39.0000	0.060	7720
63	00627200104137020000	6272-10-413702-0000	45000	160900 S Broadway	Cheng Kan Kuen	44.2000	0.130	54510
64	00627200104147330000	6272-10-414733-0000	28100	109000 Market St	Dillon John	36.0000	0.050	4100
65	00627200104167070000	6272-10-416707-0000	53100	132500 Broadway	Kittner & Fredricks Cc	73.0001	0.230	2670
66	00627200104197150000	6272-10-419715-0000	110600	252000 W Market St	Mid-Valley Oil	164.0000	0.380	20760
67	00627200104216560000	6272-10-421656-0000	56400	298400 S Broadway	Big Blue House Inc	66.0001	1.610	8500
68	00627200104226780000	6272-10-422678-0000	54000	152300 S Broadway	K D K Realty Corp	65.0000	0.280	19840
69	00627200104257290000	6272-10-425729-0000	108300	534000 Market St	Baright Realty Lid Pa	199.0000	0.400	6500
70	00627200104316940000	6272-10-431694-0000	54900	172400 S Broadway	Melley George	83.8000	0.230	3480
71	00627200104336770000	6272-10-433677-0000	83600	490000 S Broadway	K D K Realty	114.0001	1.010	28090
72	00627200104367490000	6272-10-436749-0000	61200	170000 St John St	Boccia Karin	90.2000	0.400	4680
73	00627200104407060000	6272-10-440706-0000	108900	650800 E Market St	Baright Richard S	95.0000	0.470	0

74	00627200104426860000	6272-10-442688-0000	55800	373500 S Broadway	Matway Michael	45.4000	0.670	24760
75	00627200104447200000	6272-10-444720-0000	62800	299100 E Market St	Baright Realty	73.0000	0.110	29570
76	00627200104467260000	6272-10-446726-0000	40500	181100 N Broadway	Baright Realty	58.2000	0.060	0
77	006272001045070200000	6272-10-450702-0000	62000	176000 E Market St	Baright Realty Lp	50.1000	0.180	10979
78	006272001045072200000	6272-10-450722-0000	46800	168300 E Market St	Baright Realty	46.0000	0.110	24450
79	006272001045273100000	6272-10-452731-0000	47700	340700 N Broadway	Baright Realty	79.1000	0.310	0
80	006272001045570400000	6272-10-455704-0000	15000	122000 E Market St	Rifenburgh Vernon C	46.2000	0.100	1460
81	006272001045572300000	6272-10-455723-0000	60000	136100 E Market St	Baright Realty	50.0000	0.100	0
82	006272001045972200000	6272-10-459722-0000	60000	260100 E Market St	Baright Realty	50.6000	0.150	0
83	006272001048070300000	6272-10-480703-0000	17200	120000 E Market St	Lown Donna M	50.0000	0.130	6500
84	006272001048470200000	6272-10-484702-0000	18000	110000 E Market St	Gudenzi-Ruess Raym	51.0000	0.140	7110
85	006272001046672300000	6272-10-466723-0000	83800	142600 Market St	Bulay Alexander	64.9000	0.260	3500
86	006272001047072000000	6272-10-470720-0000	35400	123000 E Market St	Haddad Christian G	22.0000	0.070	6890
87	006272001047173500000	6272-10-471735-0000	99000	346600 N Broadway	Fried Arthur L	109.0001	1.100	6500
88	006272001047270200000	6272-10-472702-0000	66100	168300 E Market St	Chan Chau Ping	47.0001	0.160	17460
89	006272001047472100000	6272-10-474721-0000	14400	14400 E Market St	Haddad Christian G	44.0001	0.160	0
90	006272001047770100000	6272-10-477701-0000	19400	110000 E Market St	Mateo Suzanne	65.0000	0.160	5860
91	006272001047872100000	6272-10-478721-0000	15000	107000 Market St	Henke Edwin D	37.0001	0.090	2280
92	006272001048269900000	6272-10-482699-0000	18000	112000 Market St	Goldman Robert E	50.0000	0.140	520
93	006272001048272100000	6272-10-482721-0000	16500	105000 E Market St	Howe Bruce	30.0001	0.110	730
94	006272001048569100000	6272-10-485691-0000	36300	104500 Market St	Coon Germaine A	48.0000	0.360	8050
95	006272001048572200000	6272-10-485722-0000	21600	115000 E Market St	Hardeman Selma B	52.0000	0.180	17840
96	006272001049071900000	6272-10-490719-0000	14000	86300 Market St	Klose Woody N	57.0000	0.160	4700
97	006272001049168900000	6272-10-491689-0000	26800	100000 E Market St	Meyer Nancy J	55.0000	0.350	3690
98	006272001049868900000	6272-10-498689-0000	29100	135900 E Market St	Laibach Richard P	88.0001	0.580	13370
99	006272001049971400000	6272-10-499714-0000	16500	106500 E Market St	Econopouly Gus	50.0001	0.120	6500
100	006272001150669000000	6272-11-506690-0000	27100	150000 E Market St	Borenstein David	62.3000	0.420	22820
101	006272001150872200000	6272-11-508722-0000	25900	150400 E Market St	Lekstrom Arvid F	60.0000	0.310	1310
102	006272001151268900000	6272-11-512689-0000	26600	159500 E Market St	Rider Caroline Vreela	62.3000	0.380	8770
103	006272001152068900000	6272-11-520689-0000	29500	183500 E Market St	Dutchess County	95.7000	0.670	10410
104	006272001152372700000	6272-11-523727-0000	34500	237400 E Market St	Baright Realty	142.0001	1.420	30470
105	006272001152671200000	6272-11-526712-0000	18700	110000 E Market St	De Pietro Jack D	75.4000	0.150	5190
106	006272001153069500000	6272-11-530695-0000	18000	115000 E Market St	Cornacchini Shella	54.0000	0.140	6500
107	006272001153271100000	6272-11-532711-0000	16500	100000 E Market St	Coons Leslie E	30.0000	0.130	6500
108	006272001153569400000	6272-11-535694-0000	18000	133400 E Market St	Umbro Joseph	50.0000	0.140	4860
109	006272001153871100000	6272-11-538711-0000	25100	160000 E Market St	Perazzo Albino	100.0000	0.230	17180
110	006272001154468800000	6272-11-544688-0000	26700	160000 E Market St	Kudla Phillip	78.0000	0.390	5080
111	006272001154671100000	6272-11-546711-0000	25800	125500 Market St	Urbn Jeffrey S	74.0001	0.300	8270
112	006272001155371500000	6272-11-553715-0000	22300	100000 Market St	Borenstein David	62.2000	0.200	6500
113	006272001155770900000	6272-11-557709-0000	30300	82300 Market St	Borenstein David	71.1000	0.170	20580
114	006272001156768600000	6272-11-567686-0000	25300	125000 E Market St	Hilser Peter T	55.0000	0.250	4340
115	006272001157070700000	6272-11-570707-0000	20600	149500 E Market St	Hill Harry H	64.0001	0.210	12320
116	006272001427144100000	6272-14-271441-0000	300	300 S Broadway	Colburn Arnold	39.0001	0.100	188660
117	006272001427145100000	6272-14-271451-0000	77400	348600 S Broadway	Colburn Joseph	173.0001	0.730	143800
118	006272001427846700000	6272-14-278467-0000	30300	158400 Broadway	Migliorelli Kenneth A	65.9000	0.750	6470
119	006272001427848500000	6272-14-278485-0000	31300	177100 Broadway	Reycam LI LLC	106.0000	0.700	6500
120	006272001427949500000	6272-14-279495-0000	28800	128500 S Broadway	Denter Louise K	91.0001	0.600	4540
121	006272001430948400000	6272-14-309484-0000	30300	150000 S Broadway	Gorsuch Thomas E	192.0001	0.750	16550
122	006272001432049300000	6272-14-320493-0000	31500	170500 S Broadway	Webster Henry J	97.4000	0.670	12810
123	006272001432246800000	6272-14-322468-0000	114500	1314500 Broadway	Rhinebeck Savings B	201.0001	2.610	13850
124	00627200002423930001	6272-00-242393-0001	0	220000 Albany Post Rd	Efstratiou Lou	0.0000	0.000	81520
125	006272000024432100000	6272-00-244321-0000	95500	353100 S Broadway	J Sokoloff & Son Inc	204.0001	1.370	2390
126	006272000024934100000	6272-00-249341-0000	117000	331200 S Broadway	Ruge Lewis J	192.0001	1.360	6250
127	006272000025636500000	6272-00-256365-0000	105000	271900 S Broadway	Triebels Garage Inc	324.0001	1.500	0
128	006272000026742900000	6272-00-267429-0000	63000	101900 Cabin Way	Colburn Arnold	234.0001	1.340	0
129	006272000028338500000	6272-00-283385-0000	41200	163000 S Broadway	Pottenburgh Michael	100.0000	0.340	11790
130	006272000028536200000	6272-00-285362-0000	26300	95000 S Broadway	Sipperley Arthur J	58.0000	0.350	8020
131	006272000029341900000	6272-00-293419-0000	25800	115000 S Broadway	Heidorn Charlotte M E	60.0000	0.280	6610
132	006272000031036100000	6272-00-310361-0000	36400	123500 S Broadway	Sipperley Arthur J	61.0001	1.500	0
133	006272000031040000000	6272-00-310400-0000	94500	138500 S Broadway	Howland Richard V	106.0001	1.300	12750
134	006272000031241000000	6272-00-312410-0000	33800	33800 S Broadway	Howland Richard V	73.0001	1.200	
135	006272000034638000000	6272-00-346380-0000	59900	238700 Route 9	Wilms Martin W	98.0001	4.150	41600
136	006272000035042100000	6272-00-350421-0000	158600	949400 So Broadway	Town Of Red Hook	189.0001	5.300	11780
137	006272001156765900000	6272-11-567659-0000	32800	115000 E Market St	Rider Eleanor Helen	44.8200	0.690	
138	006272001155366900000	6272-11-553669-0000	39400	165000 Market St	Carr Geoffrey	88.0900	2.100	
139	6272001032454600000	6272-10-324546-0000				328.0300		
140	6272001032454600000	6272-00-310385-0000				88.9200		
141	6272001028261700000	6272-10-282617-0000				115.8100		
142	6272001026557600000	6272-10-265576-0000				112.8200		

**APPENDIX D**

**ANNUAL PAYMENT ESTIMATE  
BASED ON 140 EXISTING PROPERTIES**

Interest Vision

Total Cost of \$3,500,000.borne by ext. Commercial

Loan or Annuity Variables:

Start Date:	Jun 30, 2007	End Date:	Jun 30, 2037
Start Payment:	Jun 30, 2007	No. of Payments:	30
Start Interest:	Jun 30, 2007	Interest Rate:	5.000 %
Payment Freq.:	Annually	Initial Principal:	\$3500000.00
Compound Freq.:	Annually	Payment Amount:	\$227680.02
Days in Mo./Yr.:	30 / 360	Balloon:	\$0.00
Payment Mode:	In Arrears	Amortization Method:	

No.	Date	Payment Amount	Interest Amount	Interest Rate/Yr.	Principal	Balance
	Jun 30, 2007	0.00	0.00	0.000	0.00	3500000.00
	SUBTOTAL:	0.00	0.00		0.00	
	1 Jun 30, 2008	227680.02	214864.56	5.000	12815.46	3487184.54
	SUBTOTAL:	227680.02	214864.56		12815.46	
	2 Jun 30, 2009	227680.02	207702.41	5.000	19977.61	3467206.92
	SUBTOTAL:	227680.02	207702.41		19977.61	
	3 Jun 30, 2010	227680.02	200540.26	5.000	27139.77	3440067.16
	SUBTOTAL:	227680.02	200540.26		27139.77	
	4 Jun 30, 2011	227680.02	193378.10	5.000	34301.92	3405765.24
	SUBTOTAL:	227680.02	193378.10		34301.92	
	5 Jun 30, 2012	227680.02	186215.95	5.000	41464.07	3364301.17
	SUBTOTAL:	227680.02	186215.95		41464.07	
	6 Jun 30, 2013	227680.02	179053.80	5.000	48626.22	3315674.94
	SUBTOTAL:	227680.02	179053.80		48626.22	
	7 Jun 30, 2014	227680.02	171891.65	5.000	55788.37	3259886.57
	SUBTOTAL:	227680.02	171891.65		55788.37	
	8 Jun 30, 2015	227680.02	164729.50	5.000	62950.53	3196936.04
	SUBTOTAL:	227680.02	164729.50		62950.53	
	9 Jun 30, 2016	227680.02	157567.34	5.000	70112.68	3126823.36
	SUBTOTAL:	227680.02	157567.34		70112.68	
	10 Jun 30, 2017	227680.02	150405.19	5.000	77274.83	3049548.53
	SUBTOTAL:	227680.02	150405.19		77274.83	
	11 Jun 30, 2018	227680.02	143243.04	5.000	84436.98	2965111.55
	SUBTOTAL:	227680.02	143243.04		84436.98	
	12 Jun 30, 2019	227680.02	136080.89	5.000	91599.13	2873512.42
	SUBTOTAL:	227680.02	136080.89		91599.13	
	13 Jun 30, 2020	227680.02	128918.74	5.000	98761.29	2774751.13
	SUBTOTAL:	227680.02	128918.74		98761.29	
	14 Jun 30, 2021	227680.02	121756.58	5.000	105923.44	2668827.69
	SUBTOTAL:	227680.02	121756.58		105923.44	
	15 Jun 30, 2022	227680.02	114594.43	5.000	113085.59	2555742.10
	SUBTOTAL:	227680.02	114594.43		113085.59	
	16 Jun 30, 2023	227680.02	107432.28	5.000	120247.74	2435494.36
	SUBTOTAL:	227680.02	107432.28		120247.74	
	17 Jun 30, 2024	227680.02	100270.13	5.000	127409.89	2308084.46
	SUBTOTAL:	227680.02	100270.13		127409.89	
	18 Jun 30, 2025	227680.02	93107.98	5.000	134572.05	2173512.42
	SUBTOTAL:	227680.02	93107.98		134572.05	
	19 Jun 30, 2026	227680.02	85945.82	5.000	141734.20	2031778.22
	SUBTOTAL:	227680.02	85945.82		141734.20	
	20 Jun 30, 2027	227680.02	78783.67	5.000	148896.35	1882881.87
	SUBTOTAL:	227680.02	78783.67		148896.35	
	21 Jun 30, 2028	227680.02	71621.52	5.000	156058.50	1726823.36
	SUBTOTAL:	227680.02	71621.52		156058.50	
	22 Jun 30, 2029	227680.02	64459.37	5.000	163220.65	1563602.71

No.	Date	Payment Amount	Interest Amount	Interest Rate/Yr.	Principal	Balance
SUBTOTAL:		227680.02	64459.37		163220.65	
23 Jun 30, 2030		227680.02	57297.22	5.000	170382.81	1393219.90
SUBTOTAL:		227680.02	57297.22		170382.81	
24 Jun 30, 2031		227680.02	50135.06	5.000	177544.96	1215674.94
SUBTOTAL:		227680.02	50135.06		177544.96	
25 Jun 30, 2032		227680.02	42972.91	5.000	184707.11	1030967.83
SUBTOTAL:		227680.02	42972.91		184707.11	
26 Jun 30, 2033		227680.02	35810.76	5.000	191869.26	839098.57
SUBTOTAL:		227680.02	35810.76		191869.26	
27 Jun 30, 2034		227680.02	28648.61	5.000	199031.41	640067.16
SUBTOTAL:		227680.02	28648.61		199031.41	
28 Jun 30, 2035		227680.02	21486.46	5.000	206193.57	433873.59
SUBTOTAL:		227680.02	21486.46		206193.57	
29 Jun 30, 2036		227680.02	14324.30	5.000	213355.72	220517.87
SUBTOTAL:		227680.02	14324.30		213355.72	
30 Jun 30, 2037		227680.02	7162.15	5.000	220517.87	0.00
SUBTOTAL:		227680.02	7162.15		220517.87	
GRAND TOTAL:		6830400.68	3330400.68		3500000.00	

**APPENDIX E**  
**GRINDER PUMP LITERATURE**

# The E/One Sewer System.

In the world of sewer system technology, less is more. The E/One Sewer System requires only a shallow trench and small 2- to 4-inch diameter piping. So, unlike conventional gravity central sewers, which use a 24-inch pipe and require deep excavation, the E/One Sewer System is not destructive to the landscape's natural or built features. It also costs significantly less to install and operate than a gravity system. It requires less maintenance. But it guarantees big results.

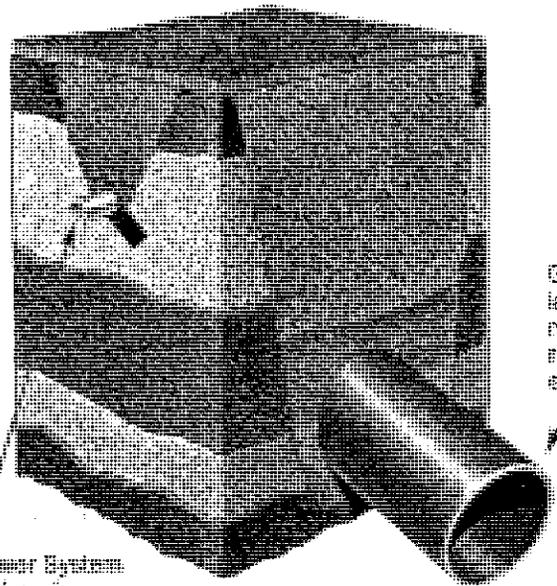
Here's the idea behind the E/One Sewer System: Both the gravity sewer system and the E/One Sewer System are known as central sewer systems. (Septic systems fall into a whole other category of waste disposal—see "The High Cost of Septic Systems" on the following page.) Most cities and many villages use central sewerage, which simply means that waste is transferred, usually by a pipe or main, to a central treatment plant.

Gravity sewers are the "original" central sewers, with origins in the Roman aqueducts. Unfortunately, the technology behind gravity sewers is also centuries-old: they're bulky systems using a large main and can require major excavation to install. They must be accurately placed and bedded along a continuous downward grade and often involve large, costly lift stations. Plus they're expensive and not entirely efficient in transporting waste because they can tend to leak.

The more advanced E/One Sewer System employs highly sophisticated technology and has become known for its reliability, minimal maintenance, low upfront costs, reduced operating expenses, and ability to be installed at any site, regardless of the challenges of topography. And only the E/One Sewer System with its GP 2000 grinder pump overcomes the challenges of low-pressure systems, performing dependably day in and day out.

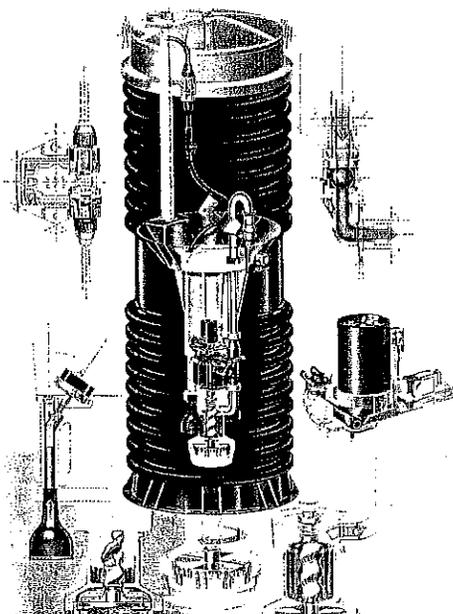
## Small Is Beautiful.

Conventional gravity sewers use a 24-inch large-diameter pipe, or main, which requires major excavation and severely disrupts the landscape and any built structures such as lawns, driveways, and plantings. The E/One Sewer System uses an unobtrusive small-diameter 2- to 4-inch main installed right below the frostline, following the natural topography of the land. The small-diameter mains mean small trenches — or, no trenches at all if directional boring is used.



Gravity system large 24-inch main. Installation requires deep excavation.

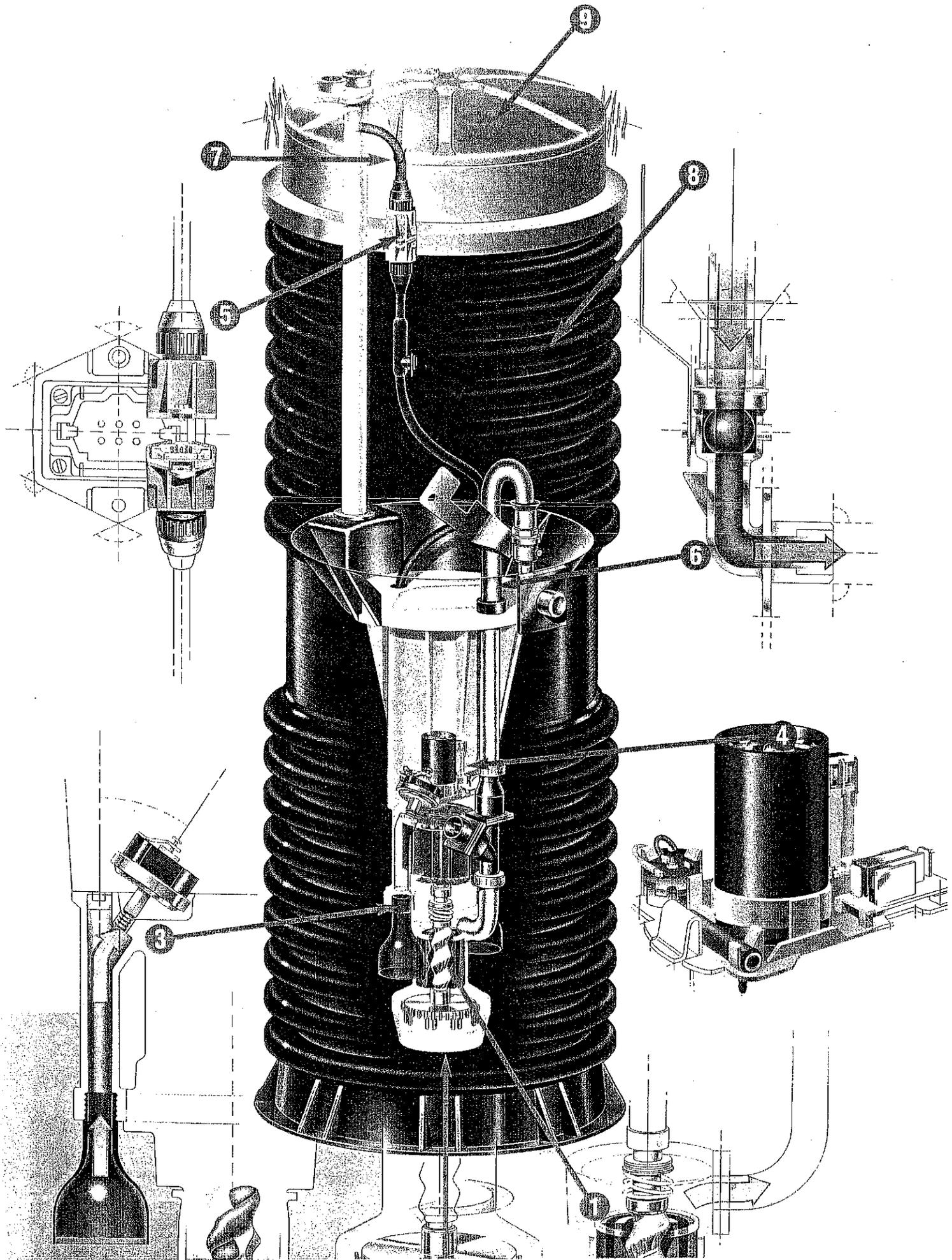
E/One Sewer System 2- to 4-inch main, installed to follow the contour of the land.



engineered  
to do one job  
perfectly.™

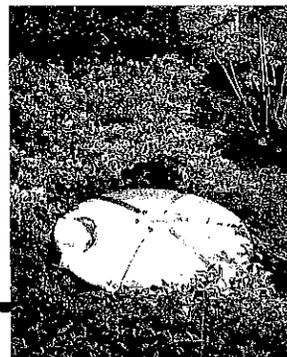
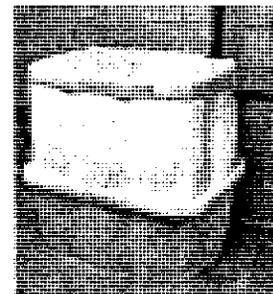
The GP 2000 grinder pump, the heart of the E/One Sewer System, provides wastewater storage, grinding, and pumping in a single unit. Translation: it lowers operating costs, the cost of waste collection, and reduces maintenance.

The E/One Sewer System grinder pump is engineered to do one thing perfectly and in the process will help communities



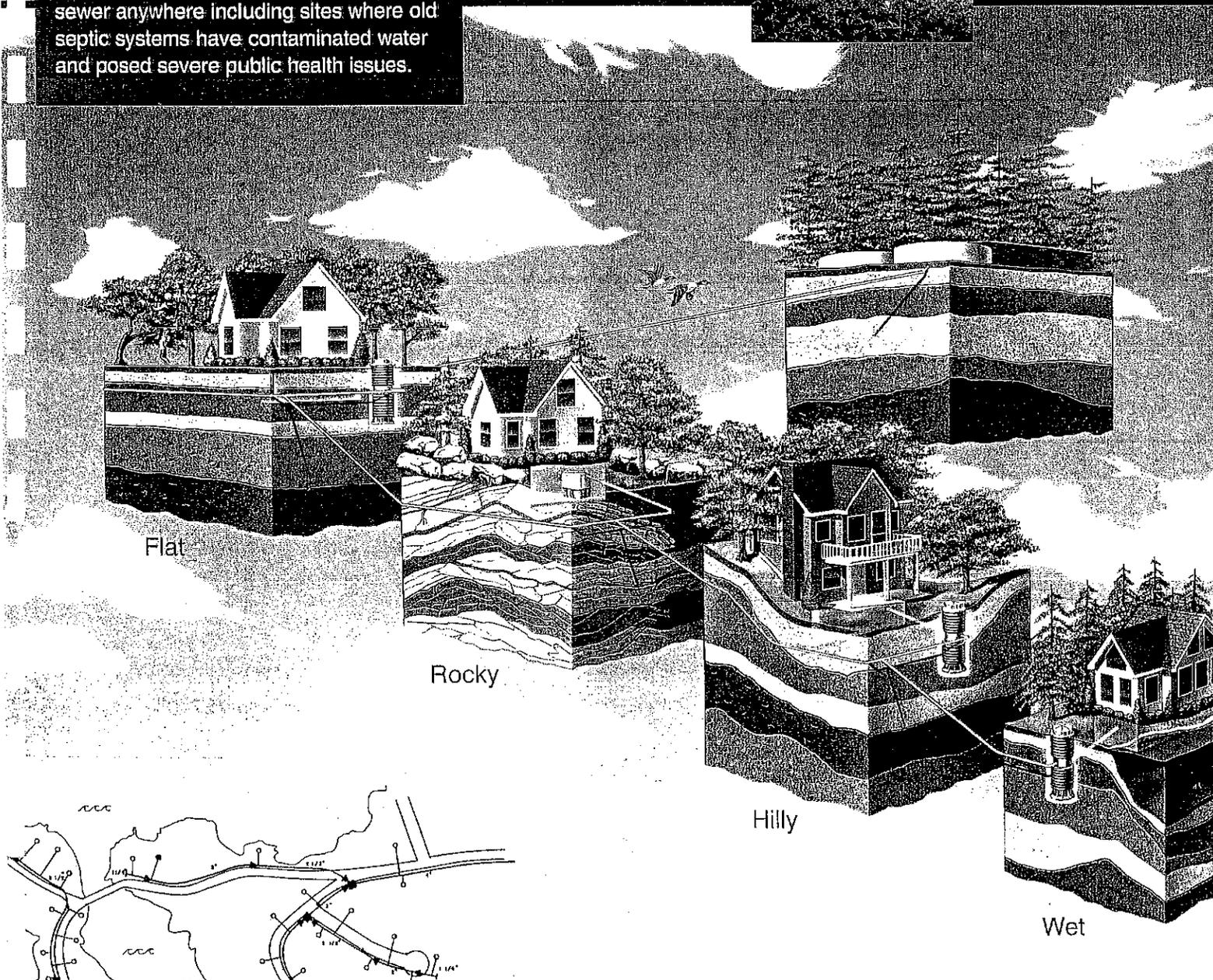
## How Does It Look From Where You Are?

Aesthetics are a major consideration for homeowners. The E/One Sewer System is virtually out of sight—the only visible part is a low-profile cover that blends seamlessly into the environment but provides easy access for servicing operations.



### Defy Gravity with E/One.

The beauty of the E/One Sewer System is that, unlike conventional central sewers, it defies gravity. Because installation follows the natural contour of the land, it is ideal for all terrain, including land that is flat, wet, rocky, or hilly. It gives the freedom to sewer anywhere including sites where old septic systems have contaminated water and posed severe public health issues.

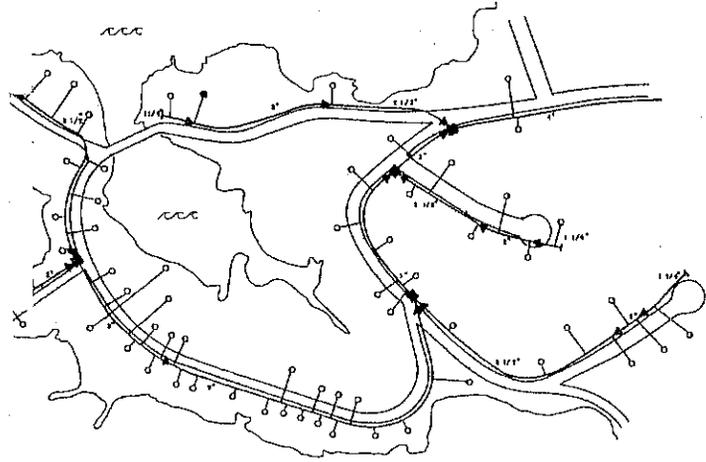


Flat

Rocky

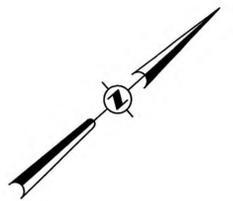
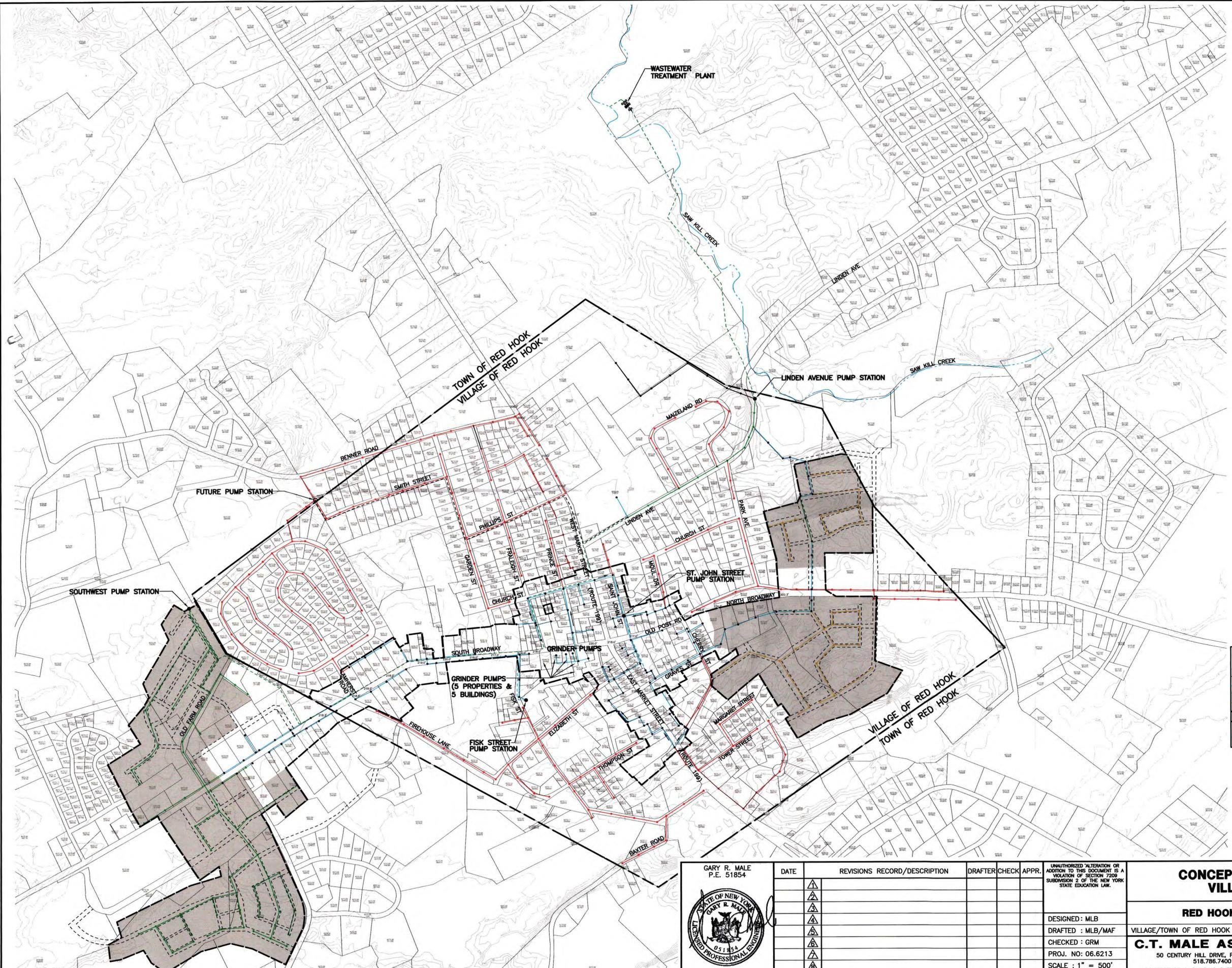
Hilly

Wet



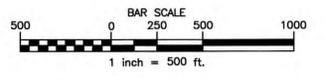
### A Sense of Site.

Multi-branch E/One Sewer Systems serve the entire community and give engineers, developers, community planners, and homeowners the freedom to sewer anywhere, on any kind of site.



**LEGEND**

- PROPOSED SANITARY SEWER FORCE MAIN
- FUTURE SANITARY SEWER FORCE MAIN
- PROPOSED SANITARY SEWER GRAVITY MAIN
- PROPOSED DEVELOPER SANITARY SEWER GRAVITY MAIN
- FUTURE SANITARY SEWER GRAVITY MAIN
- PROPOSED SEWER DISTRICT
- VILLAGE OF RED HOOK AND TOWN OF RED HOOK BOUNDARY LINE
- STREAM/CREEK



CAD DWG. FILE NAME: FIG 1 GRAVITY.DWG

CAD DWG. FILE NAME: FIG 1 GRAVITY.DWG



DATE	REVISIONS RECORD/DESCRIPTION	DRAFTER	CHECK	APPR.

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 SCALE : 1" = 500'  
 DATE : MARCH, 2007

**CONCEPTUAL GRAVITY SEWER LAYOUT  
VILLAGE/TOWN OF RED HOOK**

**RED HOOK SANITARY SEWER FEASIBILITY STUDY**

VILLAGE/TOWN OF RED HOOK DUTCHESS COUNTY, NY

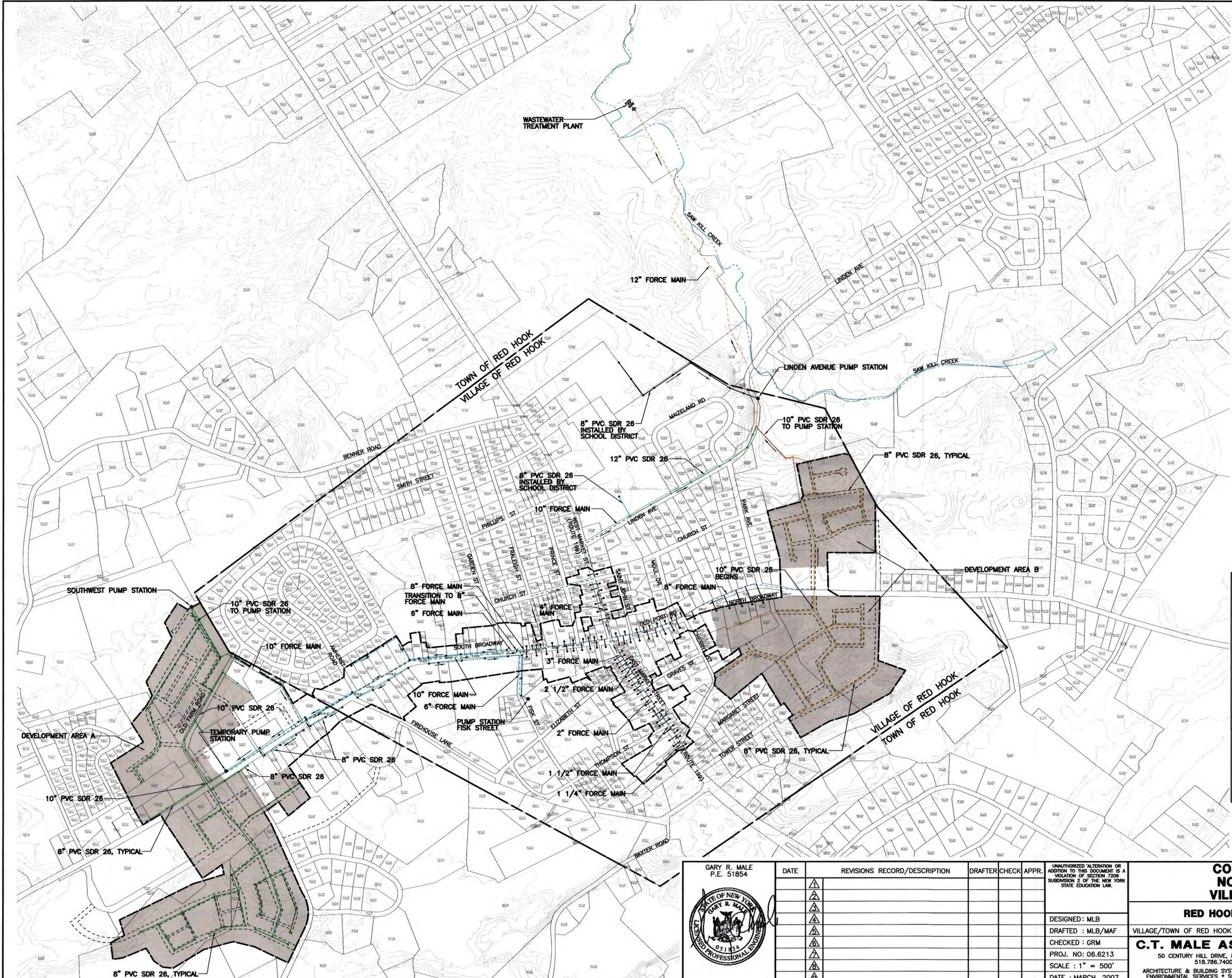
**C.T. MALE ASSOCIATES, P.C.**

50 CENTURY HILL DRIVE, P.O. BOX 727, LATHAM, NY 12110  
 518.786.7400 \* FAX 518.786.7299

ARCHITECTURE & BUILDING SYSTEMS ENGINEERING \* CIVIL ENGINEERING  
 ENVIRONMENTAL SERVICES \* SURVEY & LAND INFORMATION SERVICES

**FIG 1**

SHEET OF  
 DWG. NO:



**LEGEND**

- - - - - DEVELOPER SANITARY SEWER FORCE MAIN (SOUTH ZONE, DEVELOPMENT AREA A)
- - - - - DEVELOPER GRAVITY SANITARY SEWER MAIN (SOUTH ZONE, DEVELOPMENT AREA A)
- - - - - PROPOSED SANITARY SEWER FORCE MAIN (VILLAGE/TOWN OF REDHOOK)
- - - - - PROPOSED GRAVITY SANITARY SEWER MAIN (VILLAGE/TOWN OF REDHOOK)
- - - - - DEVELOPER SANITARY SEWER FORCE MAIN (NORTH ZONE, DEVELOPMENT AREA B)
- - - - - DEVELOPER GRAVITY SANITARY SEWER MAIN (NORTH ZONE, DEVELOPMENT AREA B)
- - - - - PROPOSED SEWER DISTRICT
- - - - - VILLAGE OF RED HOOK AND TOWN OF RED HOOK BOUNDARY LINE
- - - - - STREAM/CREEK

500 0 250 500 1000  
BAR SCALE  
1 inch = 500 ft.

CAD.DWG FILE NAME: FIG 2 NORTH FIRST.DWG

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**CONCEPTUAL SEWER LAYOUT  
NORTH DEVELOPMENT FIRST  
VILLAGE/TOWN OF RED HOOK**

**RED HOOK SANITARY SEWER FEASIBILITY STUDY**

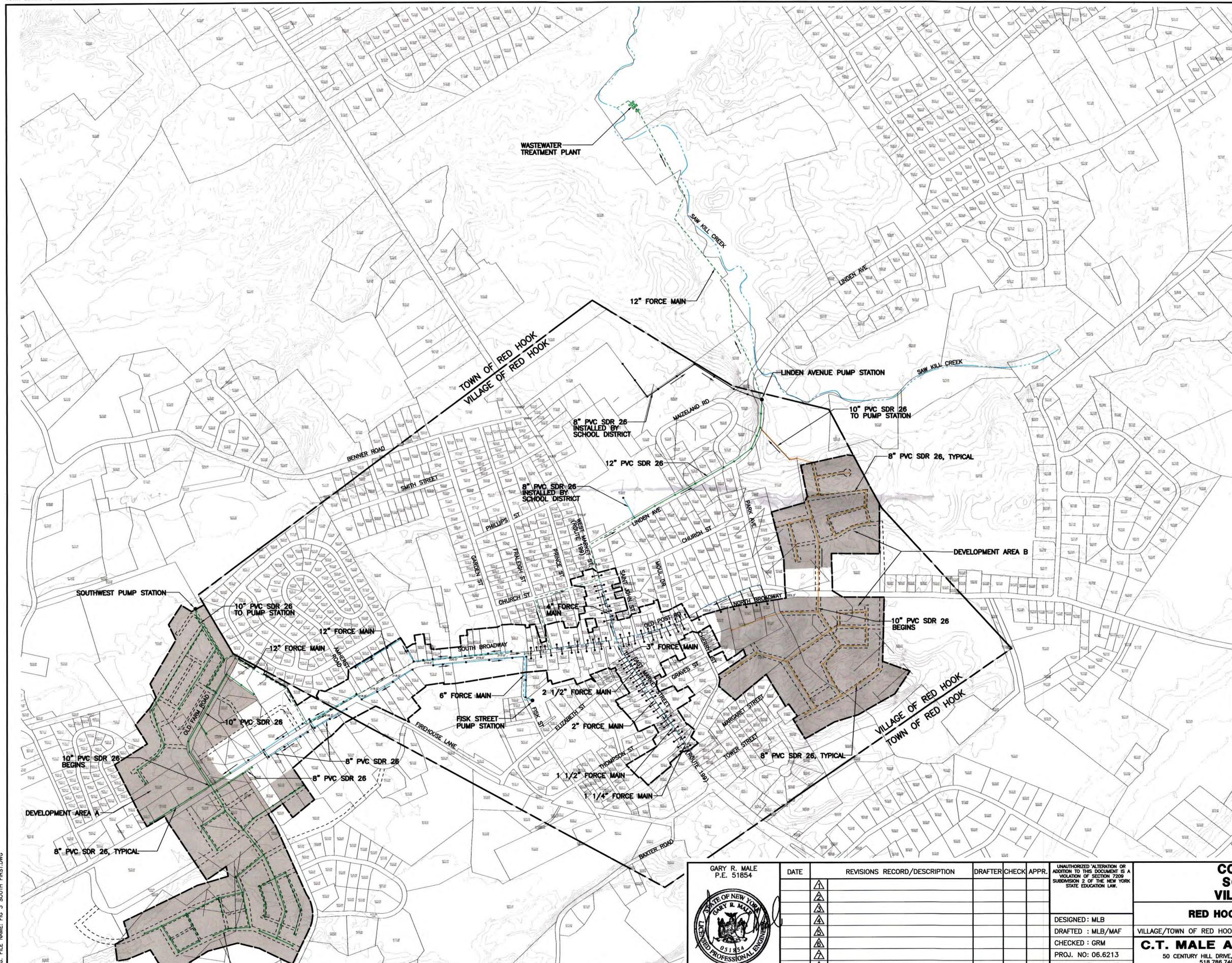
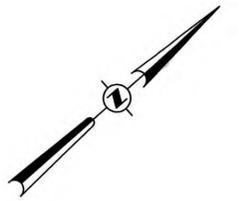
VILLAGE/TOWN OF RED HOOK DUTCHESS COUNTY, NY

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**FIG 2**  
SHEET OF  
DWG. NO:



**LEGEND**

- DEVELOPER SANITARY SEWER FORCE MAIN (SOUTH ZONE, DEVELOPMENT AREA A)
- DEVELOPER GRAVITY SANITARY SEWER MAIN (SOUTH ZONE, DEVELOPMENT AREA A)
- PROPOSED SANITARY SEWER FORCE MAIN (VILAGE/TOWN OF REDHOOK)
- PROPOSED GRAVITY SANITARY SEWER MAIN (VILAGE/TOWN OF REDHOOK)
- DEVELOPER SANITARY SEWER FORCE MAIN (NORTH ZONE, DEVELOPMENT AREA B)
- DEVELOPER GRAVITY SANITARY SEWER MAIN (NORTH ZONE, DEVELOPMENT AREA B)
- PROPOSED SEWER DISTRICT
- VILAGE OF RED HOOK AND TOWN OF RED HOOK BOUNDARY LINE
- STREAM/CREEK

500 0 250 500 1000  
 BAR SCALE  
 1 inch = 500 ft.

CAD.DWG. FILE NAME: FIG 3 SOUTH FIRST.DWG

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 P.E. 51854



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**CONCEPTUAL SEWER LAYOUT  
 SOUTH DEVELOPMENT FIRST  
 VILAGE/TOWN OF RED HOOK**

**RED HOOK SANITARY SEWER FEASIBILITY STUDY**

VILAGE/TOWN OF RED HOOK DUTCHESS COUNTY, NY

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**FIG 3**  
 SHEET OF  
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