June, 2015

Engineering Report
Red Hook Wastewater Study
Village of Red Hook
Dutchess County, New York

Prepared for:

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RED HOOK WASTEWATER STUDY
VILLAGE OF RED HOOK

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1.0 EXECUTIVE SUMMARY

The Village of Red Hook proposes to form a new sewer service area to serve the areas with frontage on Route 9 (Broadway) and Route 199 (Market Street). The study area is densely developed and the existing buildings have substandard septic systems which pose a threat to the drinking water supply. Additionally, this area of the Village of Red Hook has been planned for infill development and other high-density developments per the Centers and Greenspaces Plan. Groundwater sampling has documented the presence of fecal coliform and nitrates in some of the groundwater monitoring wells near the core business district, which is indicative of pollution from the sub-standard septic systems entering the groundwater.

Based on the existing use of the properties in the study area, 224 Benefit Units/Equivalent Dwelling Units were estimated. The cost for the proposed improvements would be divided among the benefited properties.

A pressure sewer system (STEP sewer) was identified as a viable low-cost option for providing a municipal sewer system. The STEP would require each property to have a effluent pump to connect to the sewer. The advantage of the STEP is the use of small diameter pipe that can be installed in the densely-developed areas adjacent to the state highways with minimal site restoration. The cost of the STEP was estimated at $1,332,000.

A wastewater treatment plant (WWTP) located at the current Red Hook Commons private WWTP would be upgraded to serve the Village. The treatment technology would be activated sludge with aerators followed by sand filters and UV disinfection. The cost of the WWTP upgrades was estimated at $1,898,000.

Depending on the funding package used for financing the project, the annual cost per Benefit Unit would be approximately $820 for debt repayment and $521 per year per benefit unit would be needed for operation and maintenance of the system.

2.0 INTRODUCTION

C.T. Male Associates D.P.C has been retained by the Village of Red Hook, Dutchess County, to prepare an Engineer's Report for sanitary sewer service for the existing commercial corridor within the Village along NYS Routes 9 and 199. Providing sanitary sewer service for the commercial corridor is consistent with the *Centers and Greenspaces Plan* prepared by the Intermunicipal Task Force (ITF) of the Village and Town of Red Hook. This report assesses providing sewers to properties within the Village only. Previous reports identified including a portion of the Town of Red Hook, which is no longer being considered. The study area includes dense commercial, mixed-use and residential development. There are no public sewers within the study area and all properties within the study area are served by individual septic systems. Public water service is available to all properties within the study area.

Sewer service within the Village has been extensively studied since 2006. Section 4.0 provides a summary of past studies.

The Engineer's Repot will document the following:

- Project need, including impact on the public water supply.
- Potential service area for sewer service and wastewater projections.
- Alternatives for sanitary sewer infrastructure and wastewater treatment.
- Cost estimates and cost per benefit unit.
- The document will begin the process of obtaining public review, agency comment and potential funding sources.

3.0 PROJECT NEED

The need for the project is to protect the public water supply and water quality that is currently being impacted by substandard septic systems installed within the Village.

3.1 Substandard Individual Wastewater Systems

The Village of Red Hook have identified that all of the buildings within the core business district are served by substandard or non-existent on-site wastewater systems. In general, the buildings have seepage pits with and without septic tanks. The soils in the study area are fast-draining coarse sand and gravel. The existing situation is alarming to the community because the Village's water supply is located on the same aquifer without any confining layer and the raw or partially-treated sewage is a direct threat to the drinking water supply.

This direct threat was identified in the report titled Dutchess County Aquifer Recharge Rates & Sustainable Septic System Density Recommendations. The report addressed the minimum septic system densities to prevent drinking water contamination in Dutchess County, including the Village of Red Hook.

3.2 Protect Water Supply and Water Quality

Water supply for the Village of Red Hook comes from two sources; a shallow unconfined gravel aquifer and a deeper bedrock aquifer underlying the unconfined system. As discussed in Section 6.0, nitrates and fecal coliform bacteria were found in shallow unconfined aquifer within the theoretical radius of influence of the water supply wells for the Village. The proposed sewer project would reduce the impact to the drinking water supply by removing the source of contamination from over 150 businesses, homes and multi-use buildings.

Under normal conditions, groundwater from the Village generally flows to the north and east towards the Saw Kill, away from the public water supply wells located off Firehouse Lane, as shown on Figure 1. However, under drought conditions or increased demand, the radius of influence for the wells could increase and extend towards the business corridor, where the substandard septic systems are located.

3.3 Economic Development/Master Plan

The proposed sanitary sewer project is consistent with ITF's *Centers and Greenspaces Plan*, the NYS Non-point Source Management Plan's recommended water quality policies, and both the County's and the State's open space conservation plans. The *Centers and Greenspaces Plan* proposes to preserve the prime farm land left in Dutchess County by providing infrastructure in the Village of Red Hook. With a central sewer service area and proper zoning, development can continue in the sewer service area and farm land can be saved from the pressures of suburban-style residential development.

3.4 Smart Growth

As discussed in Section 3.3, the proposed project is consistent with ITF's *Centers and Greenspaces Plan*, the NYS Non-point Source Management Plan's recommended water quality policies, and both the County's and the State's open space conservation plans. The *Centers and Greenspaces Plan* proposes to preserve the prime farm land left in Dutchess County by upgrading infrastructure in the Village of Red Hook. With a central sewer service area and proper zoning, development can continue in the sewer service area and farm land can be saved from the pressures of suburban-style residential development. In addition, the Village is promoting infill development within the core business district, which is a key development idea for Smart Growth policies. Given that the Village currently does not have public sanitary sewers, and space is limited for infill development with septic systems, the lack of sewers discourages infill development. By encouraging development within an existing developed area, impact to rural areas will be minimized.

4.0 SUMMARY OF PREVIOUS STUDIES

This report is based upon a compilation and refinement of three different studies prepared by C.T. Male Associates beginning in 2006:

- Feasibility Study for Sanitary Sewer Service, Village/Town of Red Hook, dated March 2007.
- Facility Plan for Sanitary Sewer Service, Village/Town of Red Hook, dated November 2008.
- Map, Plan and Report, Red Hook Sewer District, dated September 2009.

The *Feasibility Study for Sanitary Sewer Service- Village/Town of Red Hook* addressed the feasibility of servicing the Village/Town of Red Hook with sanitary sewers. This study included numerous alternatives for sewer service, including alternatives for service area, sanitary sewer infrastructure, wastewater treatment plan location, effluent discharge, and treatment technologies. The benefit of the Feasibility Study was to provide a focus for future reports in determining the service area, wastewater treatment plan location and type of infrastructure that would yield the most preferred sanitary sewer system for the Village Red Hook. The subsequent reports included a more refined analysis of the proposed sewer system. Section 5.0 briefly discusses the alternatives assessed in the feasibility study, with a focus on the preferred sewer system alternative.

5.0 ALTERNATIVES ANALYSIS

5.1 Properties Served

The three previous studies included a portion of the Town of Red Hook in the sewer service area. The portion of the Town in the previous studies included approximately 33 parcels along Route 9 from the Village/Town limit south to the Hannaford grocery store. The current study has removed the Town from the proposed sewer service area and includes parcels within the Village only.

5.2 Sewer System Alternatives

Three alternatives for servicing the proposed sewer service area with sanitary sewers were evaluated in the past reports:

1. All-gravity sewers and large pump stations.
2. All septic tank effluent pumping (STEP) pressure sewers.
3. A combination of STEP and gravity sewers.

In all three alternatives, it is assumed that the wastewater treatment plant will be located at the existing Red Hook Commons treatment plant. The sanitary sewer infrastructure will collect sewage from the proposed district and convey it to the existing infrastructure on the Red Hook Commons property.

5.2.1 Gravity Sewer Alternative

The gravity sewer alternative was investigated in the 2007 *Feasibility Study for Sanitary Sewer Service- Village/Town of Red Hook*. The Village of Red Hook is very flat, with an elevation ranging from USGS elevation 215-225 feet, and the commercial corridor sees even less topographic relief. As per the feasibility study, a traditional gravity system would only work if it were very deep and if it flowed to several large pump stations across the district. These pump stations would connect to larger-diameter force mains, which would convey sewage to the wastewater treatment plant site.

This alternative was not investigated in depth at the facility plan level as it would be the most costly of the three alternatives; as concluded in the previous studies.

5.2.2 STEP Sanitary Sewer Alternative

In order to service the entire proposed district with STEP sanitary sewers, the existing septic tanks at each property or building will be utilized, with a pump added to pump the effluent from the tanks into the low pressure sanitary sewer system. If the building does not contain a code-compliant septic tank, a new septic tank would be installed. Small-diameter HDPE sewer force mains would be installed in the highway right-of-way along Routes 9 and 199, beneath sidewalks and lawn areas. The STEP has been sized based on the Ten States Standards for forcemain sizing. The sizing criteria sizes the STEP system based upon a number of factors, including number/size of pumps, anticipated flow rate and the percentage of pumps on. Based upon this criteria, the Red Hook STEP system will contain 3-inch, 4-inch and 6-inch pipes. A schematic of this alternative is presented in Figure 3.

The STEP system is sized to accommodate the anticipated infill development described in the Centers and Greenspaces plan. Since this is an entirely new pressurized sewer system, the system will not see contribution from wet weather flows. Wet weather flows include infiltration/inflow and groundwater from footing drains or sump pumps. Connection of footing drains or sump pumps to this system will be prohibited, and the system will be pressurized; therefore, infiltration of groundwater into the pipes will not occur.

The preferred method of STEP system installation in Red Hook would be via directional drilling. The location of the STEP system will be in the highway right-of-way beneath sidewalks or lawn areas. The sandy soil conditions and lack of significant underground utilities allow for trenchless installation to be performed in a relatively quick manner, when compared to traditional open-cut methods. Additionally, the cost per foot for directional drilling is less expensive than open-cut methods. Directional drilling does not need to include costs for the sidewalks and lawn areas that would be significant under open-cut conditions.

At this time, the Village of Red Hook is proposing to provide effluent pumps and laterals to each property owner, and this cost is reflected in the cost estimate. The effluent pumps, septic tanks, sewer laterals and the STEP sewer main in the streets will be owned and maintained by the Village. The Village will take necessary easements to own and maintain these sewer components. It will be the responsibility of the property

owner to provide electrical power to the effluent pumps. The model, size and cost of the pump is directly related to the sewage generated from the property. The majority of effluent pumps will be standard, small residential units, and will be located in the septic tanks, but larger pumps for more substantial developments will be located in a separate tank after the septic tank.

5.2.3 Combination of STEP and Gravity Sewer Alternative

The third alternative for sanitary sewer infrastructure is a combination of a STEP system and gravity sewers. This alternative involves installing gravity sewers for most of the Village (not including Route 9), and having the gravity sewers flow to two centralized pump stations. The sewage would be pumped to the WWTP through a forcemain along Route 9. Properties along Route 9 would have a STEP system to tie into the forcemain directly. A schematic of this alternative is shown in Figure 4.

The benefits of this system would be the elimination of the need for individual effluent pumps for a portion of the village, and greater flexibility in future development along Route 9. The downside of the gravity system is the added project cost.

5.3 Wastewater Treatment Plant Alternatives

The 2007 Feasibility Study included a discussion of several locations and alternatives for the proposed wastewater treatment plant.

5.3.1 Discharge to Saw Kill or Hudson River

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 even more so than the secondary, and its siting may be unpopular and controversial.

A discharge to the Saw Kill, a trout sport fishing stream, will be controversial; however, the effluent discharge limits are available and attainable. A discharge to the Hudson River will also be controversial but likely less controversial than a discharge to the Saw Kill. 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.

5.3.2 Subsurface Discharge

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 for this type of disposal, although the specific site would need to be evaluated. This could lead to a multi-use facility with subsurface disposal underneath park land or recreational/sports fields. The drawback to the concept is maintenance (removal/replacement) when it becomes necessary in the future. If the secondary use in the dual-use concept involves a large segment of the community (i.e., recreational/sports fields), the disruption caused by maintenance could be very divisive to the community.

Both the subsurface disposal and the wetland would require large areas of land with specific characteristics. The subsurface disposal requires land which can be graded flat while still retaining the soils which have desirable percolation rates to allow for the construction and permitting of the disposal area. The constructed wetland requires land that can be graded flat and which is not currently a wetland. If the wetland site was underlain by tight clays which were non-porous, the construction cost could be reduced.

5.3.3 Red Hook Commons WWTP

The preferred option to provide wastewater treatment for the proposed sewer service area is the privately owned 25,000 gallons per day (gpd) Red Hook Commons wastewater treatment plant (WWTP), which would be obtained by the Village and its capacity would be expanded to 56,000 gpd. The existing WWTP at the Red Hook Commons site is a 25,000 gpd package activated sludge plant with flow equalization, sand filtration and UV disinfection. The plant was started in 2006 and currently treats approximately 6,000 gpd. The flow to the WWTP comes from 96 senior housing apartment units. Additionally, commercial and residential development has been approved on the Red Hook Commons site, and these developments will also discharge to the WWTP.

The 2008 Facility Plan looked at three alternatives for updates to the Red Hook Commons WWTP: A Membrane Biological Reactor Plant (MBR), a conventional extended air activated sludge or "aeration plant," and an "aerator plant," which is a MBR at the end of the treatment system that combines the functions of the secondary clarifier and the sand filter into one process. The aerator plant option was chosen, as it is the least cost alternative in the 2008 study. There is also the option of installing a second package WWTP next to the existing plant in order to expand capacity.

The sewer service area's new WWTP would have the following components:

- Influent pump station
- Fine screen
- Grit channel
- Flow meter
- Activated sludge aerator package plant
- Effluent equalization
- Disc filter building
- Ultra-Violet disinfection
- Discharge to the tributary to the Saw Kill
- Sludge Holding Tank

The current owner of the Red Hook Commons WWTP has agreed in principal to transfer the ownership of the property, sewers, pump station and WWTP to the Village at no cost.

The 12.4 acre lot where the WWTP is located has been studied in the 2008 Facility Pan and Basis of Design Reports and it was found suitable for building the needed improvements to treat 56,000 gpd. Additionally, the site can be expanded to treat up to 255,000 gpd (200,000 future capacity), if needed. The lot where the expanded WWTP would be constructed has been previously surveyed for wetlands, endangered species, and archeological significance and has a New York State wastewater discharge permit. These factors make the site ideal for the Village's WWTP.

6.0 WATER QUALITY INVESTIGATION

A water quality investigation program was established to take samples from groundwater monitoring wells and surface water locations to test for the presence of known contaminants normally associated with failing septic systems, such as caffeine, nitrates, fecal coliform and ammonia (as nitrogen). It should be noted that caffeine is a relatively new testing parameter for such studies.

6.1 Ground Water and Surface Water Description

Groundwater monitoring wells were installed at 11 locations (G-1 through G-11) and surface samples were taken at three (3) locations (S1, S2 and S3), as indicated on Figure 1. S1 was taken at a tributary to the Saw Kill, S2 was taken at a small pond at the heart of the core business district and S3 was taken at the Saw Kill. The eleven groundwater monitoring wells were generally at locations down-gradient from a groundwater perspective (north and east) of the Village's central business corridor, where the high concentration of substandard septic systems occur.

6.2 Sampling Program Results

The results of the sampling program are summarized in Appendix A of this report. Six rounds of samples were taken, with the results summarized below. It should be noted that not all sites were sampled at all six rounds, and not all samples were run for specific contaminants at each sampling point.

Detectable Limits:

- Fecal coliform: Any value over 20 CFU/100mL is considered detectable. Some samples had mat growth on the sample which indicates fecal coliform is present; however, enumeration of the concentration is not readable, as noted in Appendix A.
- Caffeine is considered non-detectable below 25 micrograms per liter.

- Nitrates in groundwater are considered elevated if the limits exceed the MCL for drinking water[1] of 10 mg/L.
- Ammonia (as nitrogen) in groundwater is also considered elevated if detected.

1. June 25, 2014 and June 26, 2014: During this round of sampling, the majority of groundwater sampling locations were tested for fecal coliform, nitrates and caffeine. Fecal coliform was encountered in wells G-1, G-2, G-4 and G-5. Nitrates were detected in wells G-1 through G-10; however, only the sample taken at monitoring well G-5 exceeded the Maximum Contaminant Level (MCL) for nitrates (10 mg/L), as defined in Part 5 of the NYS Department of Health (NYSDOH) drinking water regulations. No caffeine was encountered in any of the wells that were sampled at this time.

2. July 7, 2014: This round of sampling was performed at well G-11 only for nitrates and fecal coliform. Nitrate concentrations at this well did not exceed the MCL; however, fecal coliform was detected (mat growth was observed).

3. July 16, 2014: Caffeine, nitrates and fecal coliform were sampled at most of the groundwater monitoring wells, as well as the three surface water locations. Nitrates were detected in wells G-1 through G-11; however, only the sample taken at monitoring well G-5 exceeded the MCL. At the surface water sampling locations, nitrate concentrations were either very low or not detected. Fecal coliform was encountered in all three of the surface water samples and in monitoring wells G-1, G-3, G-6, G-7 and G-8. Mat growth of fecal and/or non-fecal coliforms was observed in samples G-2, G-4, G-5 and G-11. Again, no caffeine was encountered in any of the wells that were sampled at this time.

4. August 4, 2014: Nitrates were sampled for at groundwater monitoring wells G-1 through G-10 and fecal coliform was sampled for at G1-G11; both nitrates and fecal coliform were sampled for at all three surface water locations. Nitrate concentrations were below the 10 mg/L MCL at all sampling locations; fecal coliform was present only at monitoring well G-11 and at all three surface water locations.

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[1] Per Part 5 of the NYS Department of Health drinking water standards.

5. August 6, 2014: Ammonia was sampled for at groundwater monitoring wells G-1 through G-7. Concentrations in the samples were <1.0 mg/L, with the exception of G-1, which had ammonia concentration of 1.2 mg/L.

6. August 15, 2014: Fecal coliform was sampled for at groundwater monitoring wells G-1 through G-7. Fecal coliforms were present in samples G-1, G-2, G-4, G-5, G-6 and G-7; however, results represent estimated counts since heavy sedimentation may have inhibited growth.

On all of the sampling dates or the day(s) prior, there was some quantity of rainfall recorded, ranging from a trace to over an inch. Given that rainfall was frequent during the months in which the samples were taken, it is not possible to make a correlation between rainfall and dry periods and the sample results.

6.4 Water Quality Impacts

The results of the sampling program indicate the presence of elevated fecal coliform levels in the majority of the groundwater samples. The most prevalent location for fecal coliform was site G-1, which recorded samples of more than 1,600 CFU/mL on three occasions, with one reading at 29,000 CFU/mL. Monitoring well G-1 is located at the intersection of Church Street and Fraleigh Street, immediately down-gradient of the core business district. Higher levels of fecal coliform were also found at G-3 and G-11 on a regular basis. G-3 and G-11 are also located at the periphery of the core business district. Site G-5 saw two samples of nitrates exceed the 10 mg/L water quality standard. This site is located at Prince Street and Route 9 in the core business district.

All of the groundwater monitoring wells that saw elevated levels of fecal coliform or nitrogen are within the Village's Wellhead Protection Area, which was established to protect the Village's public water supply wells from contamination. The soil within the Village are generally coarse sands and gravels, which are not suitable to providing treatment to sanitary wastes since flows from the substandard septic systems travel through the soil too fast for the soil to provide any substantial pollutant removal. Given the limited sampling period, the results from the groundwater sampling indicate that the substandard and failing septic systems within the Village of Red Hook are impacting underlying groundwater resources.

In addition to potentially impacting groundwater within the Village's Wellhead Protection Area, the groundwater ultimately flows to surface waterbodies that are located with the Hudson River Estuary. In theory, the sanitary wastes could be impacting the estuary, although testing has not confirmed this statement.

7.0 PROPOSED PROJECT

Based on the evaluations conducted for this report, the recommended alternatives are a STEP collection system and a package WWTP. These alternatives provide a low-cost system that will reliably serve the needs of the Village of Red Hook.

7.2 Project Costs

The project costs consist of two main components, capital cost and operation and maintenance cost. The capital cost is the projected cost to build the proposed sewer system. The operation and maintenance cost is the annual cost to keep the sewer system functional.

Capital Cost

The projected capital cost for the sewer service area is $4,760,000. Appendix B details the capital cost. Table 1 summarizes the capital costs in 2016 construction dollars, since that is the anticipated construction year.

Table 1-Capital Costs

Collection System	$1,332,000
Wastewater Treatment Plant	$1,898,000
Contingency	$650,000
Engineering, Legal, and Admin.	$880,000
Total Capital Cost (2016 Dollars)	$4,760,000

Operation and Maintenance Cost

The projected first year annual operating costs (2016) for the Sewer service area is $116,900 Appendix B details the operation and maintenance (O&M) cost. Table 2 summarizes the O&M cost.

Table 2- O&M Costs

Electric	$25,000
Labor	$31,000
Sludge Disposal	$18,000
Miscellaneous	$32,000
Inflation to 2016 Dollars	$10,900
Total O&M Cost (2016 Dollars)	$116,900

O&M costs will be allocated across all developed properties connecting to the sewer system, based on actual water usage (or estimated usage where actual usage is not available.) Total annual O&M costs of $116,900 allocated across 224 developed benefit units results in an O&M cost per benefit unit of $521.88.

Hook Up Costs

The Village will provide a connection to the main line, lateral, shut off valve, effluent pump and new code-compliant septic tank (if needed) to each property. The Village plans to take easements over private property for the purpose of ownership and maintenance of the septic tank, pump and lateral.

The anticipated cost for a typical property to install an effluent pump and the private lateral is $4,000, which is reflected in the cost estimate. This cost will vary for each property depending on distance of the building to the shut off valve, soil conditions, site restoration, the need for a new code-compliant septic tank if there is not one available, and the amount of plumbing or electrical work necessary to make the connection inside the building.

7.2.3 Benefit Units

The Village has an established method for assessing the cost to the sewer area's property owners. The basis for the assessment is that a single-family residential property produces 250 gpd of wastewater. Thus, properties listed in the Dutchess County Real Property Tax Rolls as single family parcels are equal to 1.0 Benefit Units (BU). Appendix C contains a list of the parcels in the proposed district, as well as the calculation of the benefit units.

The following criteria were used to determine the BU count for each parcel.

- Properties classified as residential are assessed based on the number of dwellings up to three. Four or more dwellings are charged based on flow however no less than three units will be assessed.

- All other developed parcels are assessed benefit units upon a ratio of water use / 250 gpd.

- Where the flow ratio is not a whole number, then the result will be rounded. If the ratio is less then 1.5, a benefit unit of 1 is assessed. If the ratio is equal to 1.5 and less than 2.5, 2 benefit units are assessed and so on.

- Vacant residential parcels and any undeveloped portion of a developed residential parcel will be assessed vacant benefit units based on the total number of potential dwelling units that could be developed on the parcel.

- Vacant non-residential parcels, and any undeveloped portion of developed non-residential parcels, will be assessed vacant benefit units on the basis of the projected average daily flow for the non-residential development allowed on the parcel. Vacant units are based on the maximum square footage of a building that can be

placed on the parcel less existing structures. The maximum square footage of a building may be reduced by physical or regulated constraints such as designated wetlands, steep slopes and set backs. Based on the projected square footage of the building footprint, an estimated water demand is computed by multiplying the square footage by 0.125 gallons per day.

The number of BU's based upon the above criteria is a total of 224 units, with 41 BU's for single family residences and 183 units for commercial properties. Vacant land accounts for 2 benefit unit.

To account for the difference in benefit between a developed vs. vacant parcel, a reduction factor of .9 is applied to the rate per vacant benefit unit. Once the District is formed and the sanitary sewer system is in use, the benefit unit(s) assessed for each parcel will be re-visited on an annual basis. Changes in parcel use, water use or new construction could affect the benefit unit count and will be adjusted accordingly.

No additional infrastructure is required in order to provide sewer service to the existing and future development with Zone of Assessment A (Figure 2), the existing service area for the Red Hook Commons Sewer Transportation Corporation, as the necessary infrastructure was previously constructed by the developer of the Red Hook Commons project. In addition, the donation of the parcel of land on which the existing WWTP is located, and the existing infrastructure that will be utilized to provide service to the additional properties in Zone of Assessment B, represent a significant capital value to the Sewer service area. Accordingly, one hundred percent of the costs of the capital improvements for the Sewer service area will be assessed against properties in Zone of Assessment B, while properties within Zone of Assessment A will not be assessed for the capital costs associated with construction of the new infrastructure. Benefit Units have been assigned to properties within Zone of Assessment A for the purpose of allocating annual Operational and Maintenance (O&M) expenses only.

7.4 Cost per Benefit Unit

The projected capital cost for the project is $4,760,000. The Village is currently pursuing application for grants and low interest loans for this project through several different funding agencies, such as USDA Rural Development and the Clean Water State Revolving Fund.

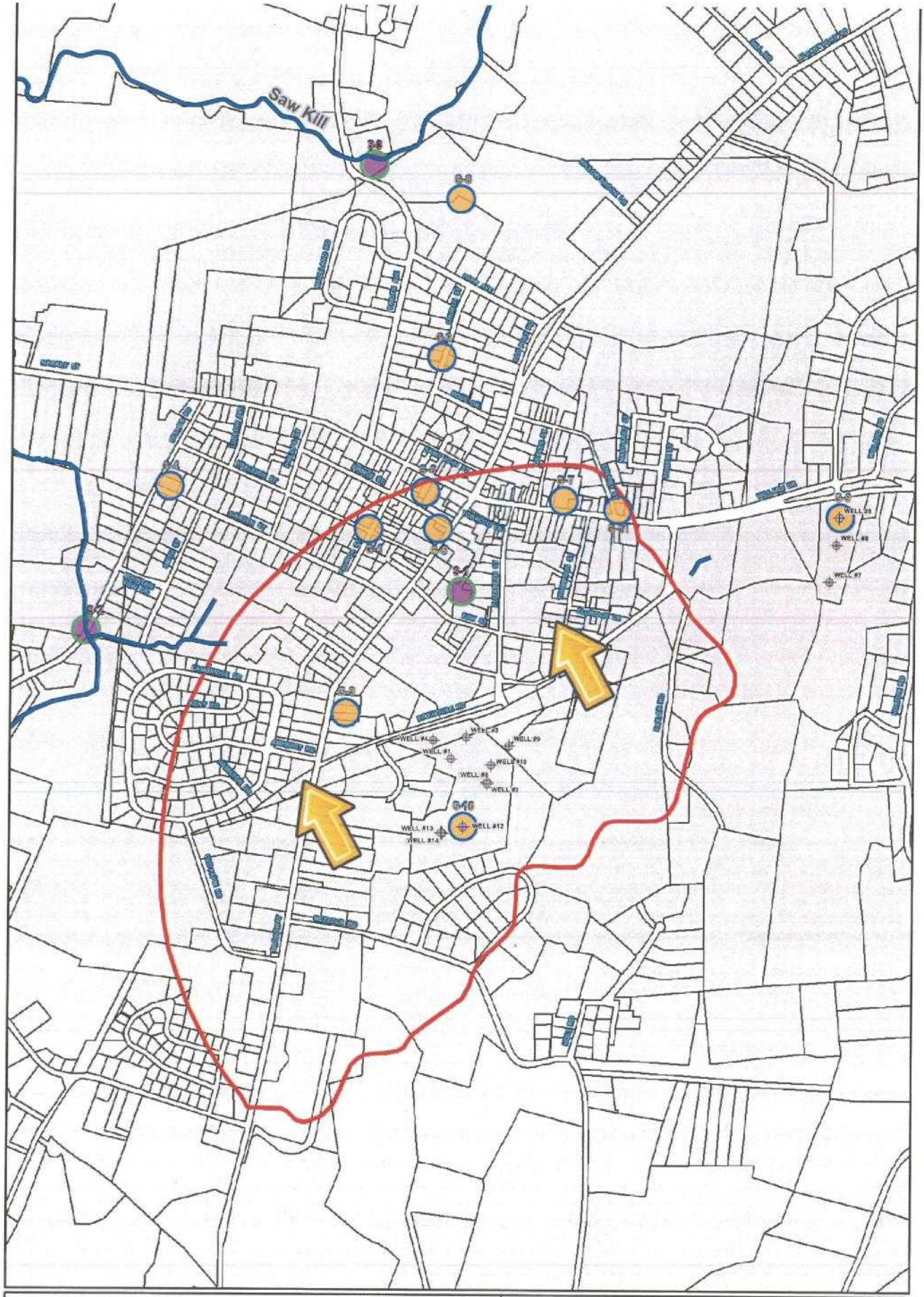
If the Village obtains financing through these agencies, there could be a low interest loan. The estimated annual debt service payment (principal plus interest) for the project is $183,720 for the $4,760,000, 1%, 30-year loan.

Based on 224 total benefit units, the annual debt service cost per BU is $820.18.

7.5 Project Schedule

The anticipated project schedule includes the preparation and completion of final design and construction bid documents in 2015, in anticipation of construction beginning during the 2016 season. It is reasonable to expect that the project could be completed in one construction season.

Figure 1:
Sampling Location Map



Legend

- Streams / Creeks
- Water Supply Wells
- Groundwater Monitoring Well Locations
- Surface Water Sampling Locations
- Wellhead Protection Area (Zone I-II)
- Red Hook Tax Parcels
- Direction of Groundwater Flow

0 300 1,600 FT

1 inch = 800 feet

Note: The locations and features depicted on this map are approximate and do not represent a field survey.

Figure 1: Sampling Locations

Village of Red Hook — Dutchess County, New York

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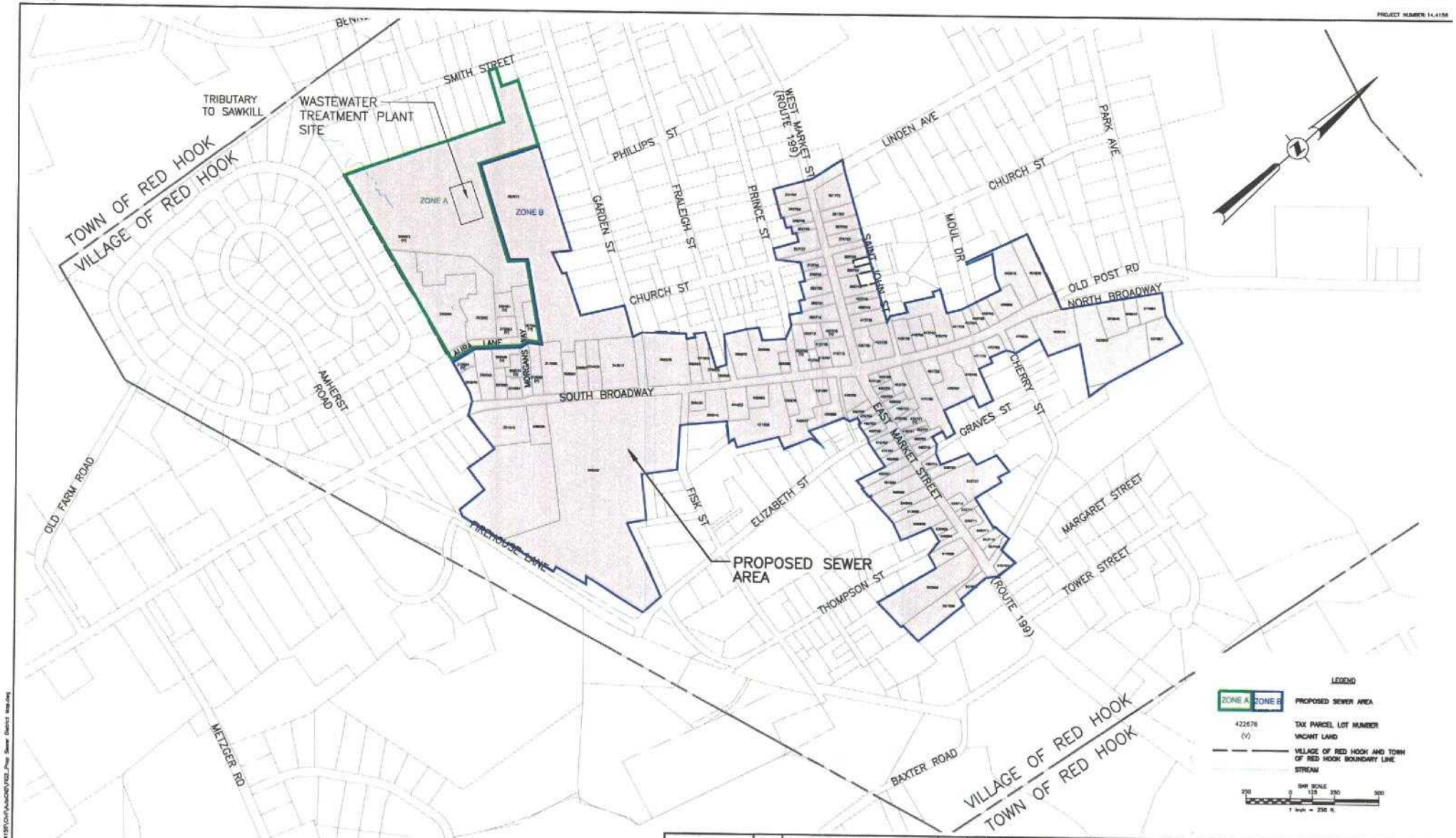
FOUNDED IN 1910

Figure 2:
Proposed Sewer Area Map



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PROJ. NO: 14.4156
SCALE : 1"=250'
DATE : AUG. 28, 2014

PROPOSED SEWER AREA BOUNDARY

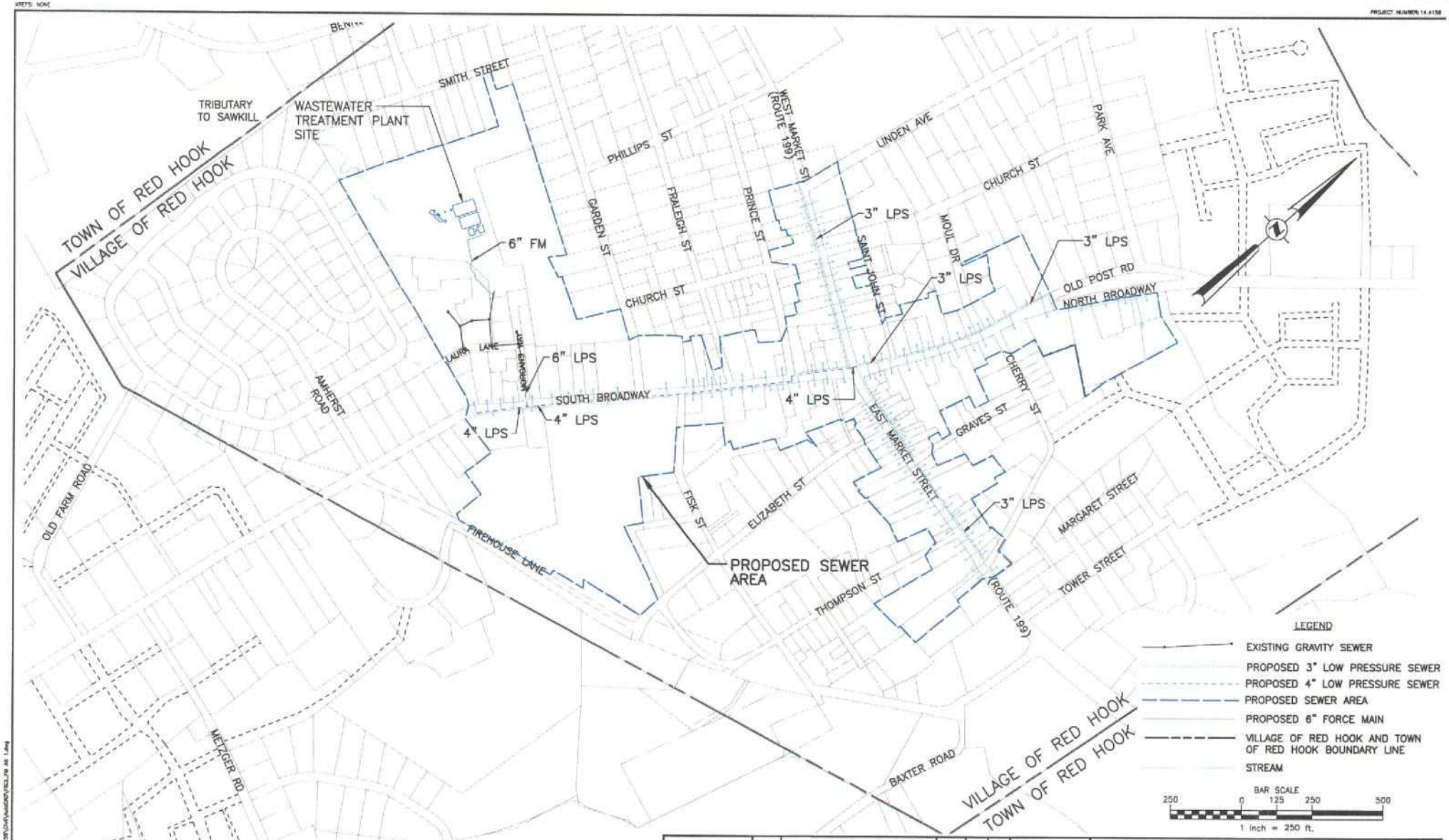
RED HOOK SEWER AREA

VILLAGE/TOWN OF RED HOOK — DUTCHESS COUNTY, NY

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture & Landscape Architecture, D.P.C.
50 CENTURY HILL DRIVE, LATHAM, NY 12110
518.786.7400 • FAX 518.786.7299

FIG2
SHEET 2 OF 4
DWG. NO: 14-0421

Figure 3:
Forcemain Alternative



DATE	REVISIONS RECORD/DESCRIPTION	DRAFTER	CHECK	APPR.

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DESIGNED : RF
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PROJ. NO: 14.4158
SCALE : 1"=250'
DATE : AUG. 28, 2014

PREFERRED ALTERNATIVE: STEP SYSTEM OPTION

RED HOOK SEWER AREA

VILLAGE/TOWN OF RED HOOK — DUTCHESS COUNTY, NY

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture & Landscape Architecture, D.P.C.
50 CENTURY HILL DRIVE, LATHAM, NY 12110
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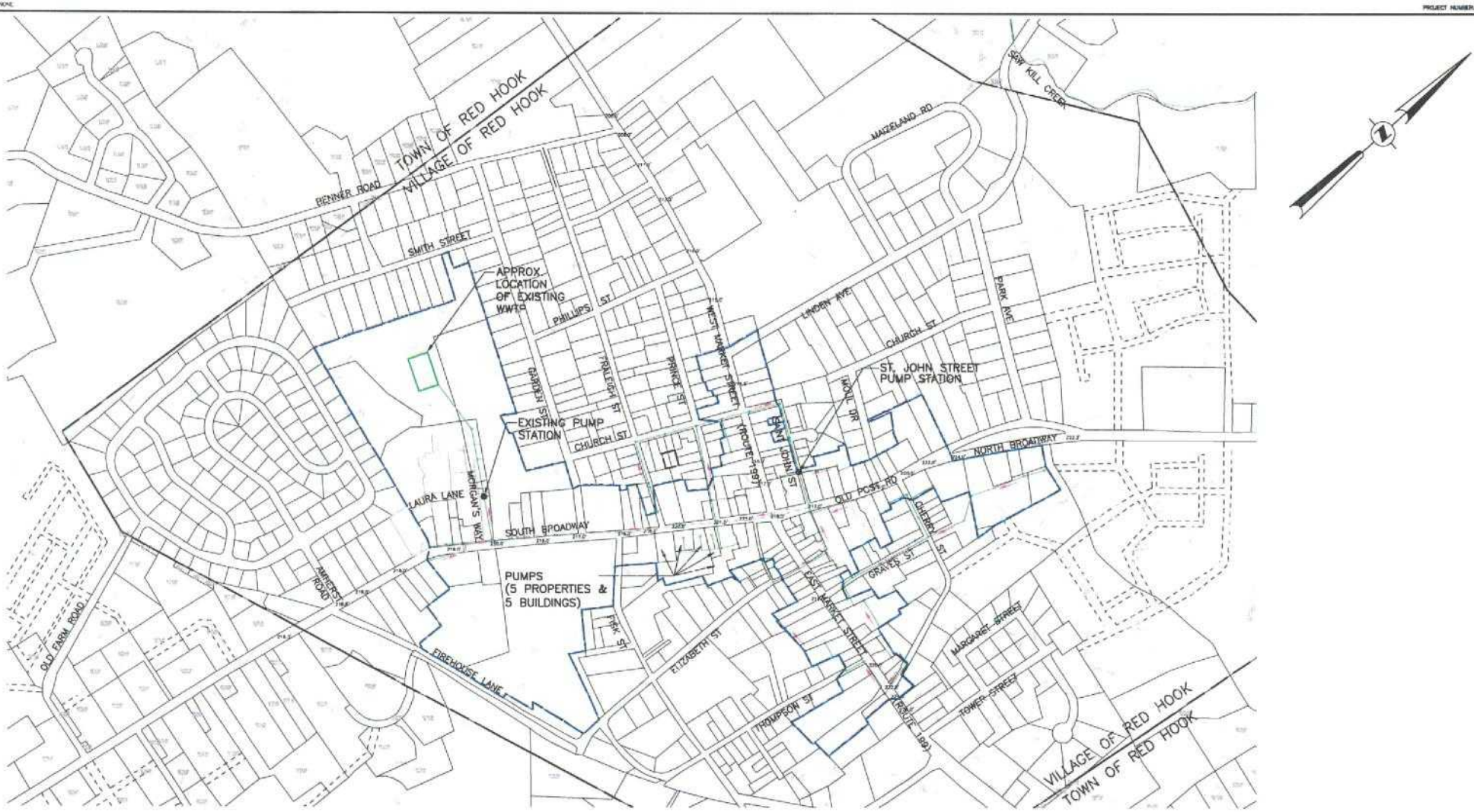
FIG3
SHEET 3 OF 4
DWG. NO: 14-0421

Figure 4:
STEP/Gravity Sewer Option



LEGEND

- PROPOSED SANITARY SEWER FORCE MAIN
- PROPOSED SANITARY SEWER GRAVITY MAIN
- PROPOSED SEWER AREA
- VILLAGE OF RED HOOK AND TOWN OF RED HOOK BOUNDARY LINE
- STREAM/CREEK
- DIRECTION OF SEWER FLOWS

BAR SCALE

300 0 150 300 600

1 inch = 300 ft.

DATE	REVISIONS RECORD/DESCRIPTION	DRAFTER	CHECK	APPR.
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			

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DESIGNED : RF
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CHECKED : RF
PROJ. NO: 14.4156
SCALE : 1"=300'
DATE : AUG. 28, 2014

BASE OPTION: CONCEPTUAL GRAVITY SEWER LAYOUT

RED HOOK SEWER AREA

VILLAGE/TOWN OF RED HOOK — DUTCHESS COUNTY, NY

C.T. MALE ASSOCIATES
Engineering, Surveying, Architecture & Landscape Architecture, D.P.C.
50 CENTURY HILL DRIVE, LATHAM, NY 12110
518.786.7400 * FAX 518.786.7299

FIG4

SHEET 4 OF 4
DWG. NO: 14-0421

Appendix A:
Sampling Results

Date Sampled	Sampling Location	Result	Units	Surface Water or Groundwater? (SW or GW)
Parameter: Caffeine; <25 = non-detect				
4/24/2014	Fishkill St. Red Hook	<25	µg/L	SW
6/25/2014	G-1	<25	µg/L	GW
6/25/2014	G-2	<25	µg/L	GW
6/25/2014	G-3	<25	µg/L	GW
6/25/2014	G-4	<25	µg/L	GW
6/25/2014	G-5	<25	µg/L	GW
6/25/2014	G-6	<25	µg/L	GW
6/25/2014	G-7	<25	µg/L	GW
6/25/2014	G-8	<25	µg/L	GW
6/25/2014	G-9	<25	µg/L	GW
6/25/2014	G-10	<25	µg/L	GW
7/16/2014	G-1	<25	µg/L	GW
7/16/2014	G-2	<25	µg/L	GW
7/16/2014	G-4	<25	µg/L	GW
7/16/2014	G-5	<25	µg/L	GW
Parameter: Nitrate-Nitrogen; MCL = 10 mg/L				
6/25/2014	G-1	2.33	mg/L	GW
6/25/2014	G-2	3.92	mg/L	GW
6/25/2014	G-3	1.15	mg/L	GW
6/25/2014	G-4	3.08	mg/L	GW
6/25/2014	G-5	32.1	mg/L	GW
6/25/2014	G-6	5.20	mg/L	GW
6/25/2014	G-7	3.27	mg/L	GW
6/25/2014	G-8	0.88	mg/L	GW
6/25/2014	G-9	<0.10	mg/L	GW
6/25/2014	G-10	0.22	mg/L	GW
7/7/2014	G-11	0.97	mg/L	GW
7/16/2014	G-1	1.9	mg/L	GW
7/16/2014	G-2	3.0	mg/L	GW
7/16/2014	G-3	1.0	mg/L	GW

Date Sampled	Sampling Location	Result	Units	Surface Water or Groundwater? (SW or GW)
7/16/2014	G-4	4.0	mg/L	GW
7/16/2014	G-5	28	mg/L	GW
7/16/2014	G-6	4.7	mg/L	GW
7/16/2014	G-7	3.8	mg/L	GW
7/16/2014	G-8	<1.0	mg/L	GW
7/16/2014	G-9	<1.0	mg/L	GW
7/16/2014	G-10	1.2	mg/L	GW
7/16/2014	G-11	1.6	mg/L	GW
7/16/2014	S-1	<1.0	mg/L	**SW**
7/16/2014	S-2	1.0	mg/L	**SW**
7/16/2014	S-3	<1.0	mg/L	**SW**
8/4/2014	G-1	3.4	mg/L	GW
8/4/2014	G-2	3.4	mg/L	GW
8/4/2014	G-3	<1.0	mg/L	GW
8/4/2014	G-4	3.5	mg/L	GW
8/4/2014	G-5	6.8	mg/L	GW
8/4/2014	G-6	4.8	mg/L	GW
8/4/2014	G-7	4.4	mg/L	GW
8/4/2014	G-8	1.0	mg/L	GW
8/4/2014	G-9	<1.0	mg/L	GW
8/4/2014	G-10	1.3	mg/L	GW
8/4/2014	S-1	<1.0	mg/L	**SW**
8/4/2014	S-2	2.3	mg/L	**SW**
8/4/2014	S-3	<1.0	mg/L	**SW**
Parameter: Fecal Coliform; MCL = 0 CFU/100mL				
6/25/2014	G-1	29,000	CFU/100mL	GW
6/26/2014	G-2	500	CFU/100mL	GW
6/26/2014	G-3	<20	CFU/100mL	GW
6/26/2014	G-4	80	CFU/100mL	GW
6/26/2014	G-5	60	CFU/100mL	GW
6/26/2014	G-6	<20	CFU/100mL	GW
6/26/2014	G-7	<20	CFU/100mL	GW
6/26/2014	G-8	<20	CFU/100mL	GW
7/7/2014	G-11	Mat	CFU/100mL	GW

Date Sampled	Sampling Location	Result	Units	Surface Water or Groundwater? (SW or GW)
		Growth[1]		
7/16/2014	G-1	4,800[2]	CFU/100mL	GW
7/16/2014	G-2	Mat Growth of Non-Fecal Coliforms[3]	CFU/100mL	GW
7/16/2014	G-3	>4,000	CFU/100mL	GW
7/16/2014	G-4	Mat Growth with Fecal Coliform[4]	CFU/100mL	GW
7/16/2014	G-5	Mat Growth with Fecal Coliform[4]	CFU/100mL	GW
7/16/2014	G-6	40	CFU/100mL	GW
7/16/2014	G-7	60	CFU/100mL	GW
7/16/2014	G-8	60	CFU/100mL	GW
7/16/2014	G-9	<20	CFU/100mL	GW
7/16/2014	G-10	<20	CFU/100mL	GW
7/16/2014	G-11	Mat Growth with Fecal Coliform[4]	CFU/100mL	GW
7/16/2014	S-1	>4,000	CFU/100mL	**SW**
7/16/2014	S-2	2,400	CFU/100mL	**SW**
7/16/2014	S-3	1,100[5]	CFU/100mL	**SW**
8/4/2014	G-1	<20	CFU/100mL	GW
8/4/2014	G-2	<18	CFU/100mL	GW
8/4/2014	G-3	<18	CFU/100mL	GW
8/4/2014	G-4	<20	CFU/100mL	GW
8/4/2014	G-5	<20	CFU/100mL	GW
8/4/2014	G-6	<20	CFU/100mL	GW
8/4/2014	G-7	<20	CFU/100mL	GW
8/4/2014	G-8	<20	CFU/100mL	GW
8/4/2014	G-9	<20	CFU/100mL	GW
8/4/2014	G-10	<20	CFU/100mL	GW
8/4/2014	G-11	68	CFU/100mL	GW

Date Sampled	Sampling Location	Result	Units	Surface Water or Groundwater? (SW or GW)
8/4/2014	S-1	1,700	CFU/100mL	**SW**
8/4/2014	S-2	180	CFU/100mL	**SW**
8/4/2014	S-3	140	CFU/100mL	**SW**
8/15/2014	G-1	1,600 or greater[6]	CFU/100mL	GW
8/15/2014	G-2	<100[6]	CFU/100mL	GW
8/15/2014	G-3	<20	CFU/100mL	GW
8/15/2014	G-4	<100[6]	CFU/100mL	GW
8/15/2014	G-5	200 or greater[6]	CFU/100mL	GW
8/15/2014	G-6	<100[6]	CFU/100mL	GW
8/15/2014	G-7	<100[6]	CFU/100mL	GW
Parameter: Ammonia, as Nitrogen				
8/6/2014	G-1	<1.0	mg/L	GW
8/6/2014	G-2	<1.0	mg/L	GW
8/6/2014	G-3	1.2	mg/L	GW
8/6/2014	G-4	<1.0	mg/L	GW
8/6/2014	G-5	<1.0	mg/L	GW
8/6/2014	G-6	<1.0	mg/L	GW
8/6/2014	G-7	<1.0	mg/L	GW

[1]The result of mat growth with fecal coliform was observed. Due to mat growth, enumeration of fecal coliform bacteria was not possible.

[2]Sample was examined 60 minutes outside of holding time. Count represents an estimation due to the presence of sedimentation which can inhibit growth of some bacteria.

[3]Due to heavy sediment and over abundant growth of non-fecal coliform present in sample, enumeration of fecal coliform was not possible.

[4]Enumeration of fecal coliform present in this sample was not possible due to the over abundant growth of non-fecal coliforms and/or sedimentation present within the samples.

[5]Result represents an estimated count due to the presence of colony spreading.

[6]Result represents an estimated count. Heavy sedimentation may have inhibited growth. Fecal MPN recommended.

Appendix B:
Cost Estimates

Project Name: Red Hook Sewer
Project# : 14.4156
Date: 8.28.2014
Prepared By: R. Flores

C.T. MALE ASSOCIATES, D.P.C.

Conceptual Cost Opinion WWTP

ID	Description	Quantity	Units	Materials	Labor	Equipment	Total Unit Cost	Cost W/O&P	Subtotals
1	Packaged WWTP								
a	30,000 gpd Steel Plant	1	LS	$550,000.00	$50,000.00	$10,000.00	$610,000.00	$671,000.00	
b	FRP Covers	1	LS	$60,000.00	$10,000.00	$2,000.00	$72,000.00	$79,200.00	
c	Excavation, fill, backfill	667	CY	$15.00	$15.00		$30.00	$22,000.00	
d	Electrical	1	LS				$30,000.00	$33,000.00	
									$805,200.00
2	Packaged Filter & UV								
a	Steet Plant	1	LS	$60,000.00	$25,000.00	$5,000.00	$90,000.00	$99,000.00	
b	FRP Covers	1	LS	$30,000.00	$5,000.00	$1,000.00	$36,000.00	$39,600.00	
c	Excavation, fill, backfill	333	CY	$15.00	$15.00		$30.00	$11,000.00	
d	Electrical	1	LS				$20,000.00	$22,000.00	
									$ 171,600.00
3	General Condition								
a	Insurance & Bonds	1	LS				$50,000.00	$55,000.00	
b	Mobilization	1	LS				$100,000.00	$110,000.00	
c	PM & General Condition	1	LS				$150,000.00	$165,000.00	
									$ 330,000.00
4	Collection System								
a	Mob & De-Mob, General Conditions	1	LS				$50,000.00	$55,000.00	
b	Stakeout and Test Pits	1	LS				$40,000.00	$44,000.00	
c	3-inch LPSS	4200	LF				$35.00	$161,700.00	
d	4-inch LPSS	2180	LF				$37.00	$88,726.00	
e	6-inch LPSS	460	LF				$40.00	$20,240.00	
f	Septic Tanks & Effluent Pumps	123	EA	$3,700.00			$3,700.00	$500,610.00	
g	Lateral Kits	123	EA				$325.00	$43,972.50	
h	Sidewalk Replacement	375	SY				$12.00	$4,950.00	
i	Erosion and Traffic Control	1	LS				$21,000.00	$23,100.00	
j	General Restoration	1	LS				$200,000.00	$220,000.00	
									$ 1,162,298.50
5	Laterals								
a	1-1/4" HDPE	7440	LF				$25.00	$204,600.00	
b	Plumbing Connection	123	EA				$500.00	$67,650.00	
c	Additional Restoration	1	LS				$97,150.00	$106,865.00	
d	Easements	123	EA				$600.00	$81,180.00	

Project Name: Red Hook Sewer
Project# : 14.4156
Date: 8.28.2014
Prepared By: R. Flores

C.T. MALE ASSOCIATES, D.P.C.

Conceptual Cost Opinion WWTP									
ID	Description	Quantity	Units	Materials	Labor	Equipment	Total Unit Cost	Cost W/O&P	Subtotals
									$460,295.00
	Cost Summary								

2014 Construction Cost Subtotal	$2,929,393.50
2016 Construction Cost Subtotal (5% increase/year)	$ 3,230,000.00
Admin (Interest, Publishing, Audit)	$ 50,000.00
Engineering (Preliminary, Design, Construction, Archaeology, Survey)	$ 800,000.00
Legal (IMA, Bonds, Contracts, District)	$ 30,000.00
20% Contingency	$ 650,000.00
Project Costs	$ 4,760,000.00

Project Name: Red Hook Sewer District
Project# : 14.4156
Date: 8/29/2014
Prepared By: R. Flores

C.T. MALE ASSOCIATES, D.P.C.

Conceptual Cost Opinion Aerotor WWTP O&M

ID	Description	Quantity	Units	Unit Cost			Total Unit Cost	Subtotals
1	Electric							
a	Influent Pumps	8212.5	kwh	$0.14			$1,149.75	
b	Fine Screen	13140	kwh	$0.14			$1,839.60	
c	Aerotors	54750	kwh	$0.14			$7,665.00	
d	EQ & DO Tank	32850	kwh	$0.14			$4,599.00	
e	Filters	12000	kwh	$0.14			$1,680.00	
f	UV Tanks	18250	kwh	$0.14			$2,555.00	
g	Sludge Holding Tank	32850	kwh	$0.14			$4,599.00	
h	Buildings	3650	kwh	$0.14			$511.00	
								$24,598.35
2	Labor							
a	Contract Operator	1040	hr	$30.00			$31,200.00	
								$31,200.00
3	Septic Tank & Sludge Removal							
a	Septic Tank & Sludge Disposal	90000	gal	$0.08			$7,200.00	
b	Septic Tank & Sludge Hauling	12000	mile	$0.89			$10,620.00	
								$17,820.00
4	Other							
a	Lab	1	LS	$3,000.00			$3,000.00	
b	Supplies	1	LS	$5,000.00			$5,000.00	
c	Maintenance	1	LS	$5,000.00			$5,000.00	
d	Phone	1	LS	$720.00			$720.00	
e	Vehicals	1	LS	$5,200.00			$5,200.00	
f	Short-lived Assets Replacement	1	LS	$13,000.00			$13,000.00	
								$31,920.00
	Cost Summary							

Sub-Total	$105,538.35
2014 Dollars	$ 106,000.00
2015 Dollars	$ 116,900.00

Appendix C:
Parcel Listing/EDU Count

Red Hook Sewer District
RED HOOK, NEW YORK

Prepared By:
C.T. Male Associates, D.P.C.
3/2/2015

All ID's are Section 6272

Modified based upon 2014 Water Consumption Data

Hook UP	Customer Name	Service Located	Tax ID (block-lot)	Land Use	AC	Ave Daily Water Use (gpd)	SF EDU	Res Multi EDU	Com EDU
	Village of Red Hook								
	North Broadway - Before Cherry St.								
1	Burkley,Brandon	**7592 N. Broadway**	**07-514864**	484	0.51	41			1
2	Rotger, Scott	**7590 N. Broadway**	**07-531857**	410	0.66	7		4	
3	North Broadway Pizza	**7588 N. Broadway**	**07-506847**	423	0.29	694			5
4	LaVeglia Group Red Hook Commons Plaza	**7582 N. Broadway**	**07-503840**	484	0.6	360			2
5	Red Hook Business Park	**7578 N. Broadway**	**07-522832**	481	2.6	375			3
6	Red Hook IGA	**7568 N. Broadway**	**06-490816**	454	1.1	0			3
7	Elmendorf Inn	**7562 N. Broadway**	**06-479800**	210	0.47	21			1
8	Butcher, Alice P	**7563 N. Broadway**	**06-459805**	210	0.54	45	1		
9	Staff, Christopher G	**7567 N. Broadway**	**06-450818**	220	1.11	228		2	
10	Pagano, Elizabeth Grand Dutchess Bed & Bre	**7571 Old Post Road**	**06-454830**	283	0.847	330		1	1
		Subtotals					**1**	**7**	**16**
							45		
	North Broadway - Between Cherry St. and St. John St.								
11	Stewart's Shops Corp.	**7558 N. Broadway**	**06-473785**	486	0.1	318			2
12	Cuthell, Erik	**7557 N. Broadway**	**06-456795**	210	0.23	36	1		
13	Cole, Allen Richard	**7555 N. Broadway**	**06-455789**	210	0.21	84	1		
14	Village Diner	**7550 N. Broadway**	**06-471776**	422	0.23	1153			8
15	Bard, Richard	**7549 N. Broadway**	**06-453784**	283	0.17	104		2	
16	Nicolas-Marcy, Michael	**7545 N. Broadway**	**06-451778**	210	0.3	135	1		
17	Baright Realty	**7540 N. Broadway**	**06-478765**	411	0.69	361		2	
18	Bischoff, Steve	**7537-7539 N. Broadway**	**06-440772**	483	0.905	321			3
19	Keil Equipment Co., INC.	**7536 N. Broadway**	**06-470753**	455	1	53			1
20	Golden, Paula; Papreka, P	**7531 N. Broadway**	**06-443763**	483	0.28	214		1	1

21	Scheer Cleaners	**7528 N. Broadway**	**06-461750**	484	0.3	170			1
22	Verrilli, Richard (Post Office)	**7525 N. Broadway**	**06-440756**	465	0.31	125			1
23	CVS Store # 5359	**7518 N. Broadway**	**10-471735**	454	1.1	71			1
24	Getty (owned by Syed Yasin)	**7519 N. Broadway**	**10-436749**	432	0.4	43			1
		Subtotals					**3**	**5**	**19**

							255		
	North Broadway - Between St. John St. and Market								
25	Baright Realty	**7514 N. Broadway**	**10-452731**	482	0.31	383		3	1
26	Rhtel LLC	**7509 N. Broadway**	**10-429738**	465	0.53	233			2
27	Baright Realty	**7506-7508 N. Broadway**	**10-446726**	482	0.07				1
		Subtotals						**3**	**4**
	West Market - Between Broadway and Church St.								
28	Baright Realty	**15 W. Market St.**	**10-425729**	481	0.4	756		5.5	1
29	Dillon, John	**10 W. Market St.**	**10-413739**	283	0.343			3	
30	Keybank	**28 W. Market St.**	**10-395718**	462	0.53	36			1
31	Christian Lodge	**31 W. Market St.**	**10-408743**	481	0.1	305			2
32	Fell, David	**37 W. Market St.**	**10-403746**	283	0.16	31		1	1
33	Taste Budd's, LLC	**40 W. Market St.**	**10-390724**	483	0.29	527			4
34	Joanne Wade	**39 W. Market St.**				91	1		
35	Red Hook Holdings LLC	**41-43 W. Market St.**	**10-396745**	280	0.34	571	1	2	
36	K. D. K. Realty	**42 W. Market St.**	**10-383729**			148			1
37	Perkel, Dr. Steven	**44 W. Market St.**	**10-383729**			362			3
38	K. D. K. Realty	**46 W. Market St.**	**10-378736**	283	0.1	90			1
	Borenstine, David	*47 W. Market St.*	*06-390752*						
	Borenstein, David	*45 W. Market St.*	*06-390752*						
39	TOTAL	**45-47 W. Market St.**	**06-390752**	220	0.26	266		2	
40	Trezza, Gloria	**49 W. Market St.**	**06-383756**	283	0.26	42		1	1
		Subtotals					**2**	**14.5**	**15**

	West Market - Between Church St. and Linden Ave.								
41	Methodist Church	**Church Street**	**10-373736**	311	0.1	112			1
42	Methodist Parsonage	**52 W. Market St.**	**10-357737**	620	0.62	472	1		
43	Dominy, Michele	**51 W. Market St.**	**06-374762**	210	0.31	177	1		
44	Simmons, Herbert	**53 W. Market St.**	**06-367763**	210	0.1	37	1		
45	Scheer, Jonathan M.	**54 W. Market St.**	**10-353746**	210	0.1	69	1		
46	Agrest, Sara	**56 W. Market St.**	**10-348748**	210	0.237	49	1		
47	Steerman, James	**57 W. Market St.**	**06-361767**	210	0.31	282	1		
48	Cirincion, John and Cubba	**58 W. Market St.**	**06-342750**	210	0.284	174	1		
49	Monahan-Tennant, James	**59 W. Market St.**	**06-351772**	280	0.674			2	
50	Guido, Frank	**60 W. Market St.**	**06-334754**	210	0.39	211	1		
		Subtotals					**8**	**2**	**1**
							1472		
	East Market - Between Broadway and Elizabeth St.								
	Baright Realty	*3 E. Market St.*	*10-444720*						
	Baright Realty	*3 E. Market St.*	*10-444720*						
	Baright Realty	*7 E. Market St.*	*10-444720*						
51	TOTAL	**1-7 E. Market St.**	**10-444720**	481	0.11	1049			7
	RHVBR LLC	*2 E. Market St.*	*10-440706*						
	RHVBR LLC	*10 E. Market St.*	*10-440706*						
	RHVBR LLC	*10 E. Market St.*	*10-440706*						
52	TOTAL	**2-12 E. Market St.**	**10-440706**	482	0.516	889		1	6
	Baright Realty	*17 E. Market St.*	*10-455723*						
	Baright Realty	*19 E. Market St:*	*10-459722*						
	Baright Realty	*21 E. Market St.*	*10-459722*						
53	TOTAL	**15-21 E. Market St.**	**10-459722**	482	0.152	393		1	1
54	Baright Realty	**9 E. Market St.**	**10-450722**	482	0.11	736		1	5
55	Baright Realty	**16 E. Market St.**	**10-450702**	481	0.18	83		1	1
56	Rifenbergh, Mrs. Vernon S.	**20 E. Market St.**	**10-455704**	210	0.1	16	1		
57	Lown, Donna	**22 E. Market St.**	**10-460703**	210	0.13	87	1		
58	Lyceum Theater	**23 E. Market St.**	**10-466723**	510	0.25	824			5
59	Gudenzi-Ruess, Raida	**24 E. Market St.**	**10-464702**	283	0.14	35		1	1
		Subtotals					**2**	**5**	**26**
							103		

	East Market - Between Elizabeth St. and Graves St.							
60	Haddad, Randolph	**25 E. Market St.**	**10-470720**	482	0.07	30			1
61	Chan-Mohammed, Chau	**28 E. Market St.**	**10-472702**	421	0.16	307			2
62	Henke Insurance Agency	**29 E. Market St.**	**10-478721**	210	0.09	47			1
63	Blue Lake House, LLC	**30 E. Market St.**	**10-477701**	210	0.14	190		1	
64	Star Travel	**31 E. Market St.**	**10-482721**	210	0.11	34		1	
65	Goldman, Robert and Claire	**32 E. Market St.**	**10-482699**	283	0.14	253		2	1
66	Hardman, Selma	**33 E. Market St.**	**10-485722**	210	0.18	190	1		
67	Coon, Germaine	**34 E. Market St.**	**10-485691**	210	0.362	194	1		
68	Klose, Woody	**35 E. Market St.**	**10-490719**	283	0.16	31		1	1
69	Meyer, Nancy J.	**36 E. Market St.**	**10-491689**	210	0.355	0	1		
70	Econopoly, Gus	**37 E. Market St.**	**10-499714**	210	0.12	202	1		
		Subtotals					**4**	**5**	**6**
							587		
	East Market - Between Graves St. and Thompson St.								
71	Laibach Associates	**38 E. Market St.**	**10-498689**	411	0.58	233		2	
72	Lekstrom, Arvid	**39 E. Market St.**	**11-508722**	210	0.31	31	1		
73	Borenstine, David	**40 E. Market St.**	**11-506690**	210	0.42	173	1		
74	Rider, Caroline	**42 E. Market St.**	**11-512689**	210	0.38	80	1		
75	Baright Realty	**43 E. Market St.**	**11-523727**	230	1.427	704	1	2	
76	Dut. Co. Comm. Action Agency	**44 E. Market St.**	**11-520689**	230	0.672	159		3	1
77	Jack DiPietro	**45-47 E. Market St.**	**11-526712**	220	0.154	148		2	
78	Alfio H. Cornacchini Arch	**48 E. Market St.**	**11-530695**	210	0.14	58	1		
79	Coons, Leslie	**49 E. Market St.**	**11-532711**	210	0.13	107	1		
80	Lowry, Stephen and Maureen	**50 E. Market St.**	**11-535694**	280	0.14	223		2	
81	Perazzo, Albino	**51 E. Market St.**	**11-538711**	220	0.23	113		2	
82	Kudla, Phillip	**52 E. Market St.**	**11-544688**	220	0.39	34		2	
		Subtotals					**6**	**15**	**1**
							448		

	East Market - After Thompson St.								
83	Urbin, Lori	**53 E. Market St.**	**11-546711**	210	0.309	142	1		
84	Fier, Jennifer	**56 E. Market St.**	**11-553669**	210	2.1	85	1		
85	Borenstine, David	**57 E. Market St.**	**11-553715**	220	0.201	280		2	
86	Borenstine, David	**59-61 E. Market St.**	**11-557709**	425	0.17	550		1	4
87	Rider, Eleanor	**60 E. Market St.**	**11-567659**	210	1	151.5	1		
88	Hillster, Peter	**62 E. Market St.**	**11-567686**	283	0.25	75		1	1
89	Borenstine, David	**63 E. Market St.**	**11-570707**	230	0.212	165		3	
		Subtotals					**3**	**7**	**5**
							302		
	South Broadway - Between Market and Prince St.								
	Matwey, Michael	*1 S. Broadway*	*10-442688*						
	Matwey, Michael	*3 S. Broadway*	*10-442688*						
	Matwey, Michael	*3 S. Broadway*	*10-442688*						
	Matwey, Michael	*7488 S. Broadway*	*10-442688*						
	Matwey, Michael	*1 Tobacco Lane*	*10-442688*						
	Matwey, Michael	*3 Tobacco Lane (Apt 6)*	*10-442688*						
	Matwey, Michael	*5A Tobacco Lane*	*10-442688*						
	Matwey, Michael	*7 Tobacco Lane*	*10-442688*						
90	TOTAL	**7484 S. Broadway**	**10-442688**	482	0.67	3275			22
91	Extra-Mart D/B/A	**2 W. Market St.**	**10-419715**	486	0.386	189			1
92	Eckelman, Stephen and Marya	**7485 S. Broadway**	**10-402710**	411	0.28	342		2	
	Kittner and Fredricks	*7483 S. Broadway*	*10-416707*						
	Kittner and Fredricks	*7481 S. Broadway*	*10-416707*						
93	Total	**7481-7483 S. Broadway**	**10-416707**	485	0.23	985			7
94	Cheng, Kankuen	**7479 S. Broadway**	**10-413702**	421	0.13	1027		1	7
95	Powers Auto Supplies, INC.	**7478 S. Broadway**	**10-431694**	484	0.23	55			1
96	K. D. K. Realty	**7472 S. Broadway**	**10-433677**	482	1.011	638			4
		Subtotals					**0**	**3**	**42**
97	**South Broadway - Between Prince St. and Fraleigh St.**								
98	Village Hall	**7467 S. Broadway**	**10-404688**	652	0	720			5
99	K. D. K. Realty	**7466 S. Broadway**	**10-422678**	483	0.28	614		1	4
100	Giek, Kenneth	**7461 S. Broadway**	**10-392686**	471	0.89	212		1	2
101	Ayoub, Nabil	**7460 S. Broadway**	**10-421656**	418	1.618	780			5
102	Griffin Insurance Agency	**7452 S. Broadway**	**10-408663**	464	0.35	1			1
103	Eccles, Thomas and Jennifer	**7449 S. Broadway**	**10-385673**	210	0.785	225	1		

		Subtotals				**1**	**2**	**17**
						225		
	South Broadway - Between Fraleigh St. and Garden St.							
104	Red Hook Public Library	**7444 S. Broadway**	**10-404652**	611	0.49	76		1
105	Phillips, Velma	**7441 S. Broadway**	**10-385658**	210	0.13	431	1	
106	Edgecrest LLC	**7437 S. Broadway**	**10-378656**	210	0.13	209	1	
107	Seitz, Elizabeth	**7436 S. Broadway**	**10-398640**	210	0.63	874	1	
108	Stokum, Jeff and Jenny	**7435 S. Broadway**	**10-371656**	210	0.36	216	1	
109	Diamond, Douglas	**7432 S. Broadway**	**10-388636**	210	0.23	79	1	
110	Odom, Ronald	**7431 S. Broadway**	**10-368650**	230	0.36	126	1	
111	Christ Church	**7423-7429 S. Broadway**	**10-358639**	620	1.6	263		2
		Subtotals				**6**	**0**	**3**
						1934		

	South Broadway - Between Garden St. and Laura Lane/Morgan Dr.							
112	St. Pauls Lutherian Church	**7412 S. Broadway**	**10-395562**	620	14.96	210		1
113	St. Christopher Church	**4 Garden St.**	**10-343617**	620	1.3	9		1
114	St. Christopher Rectory	**7411 S. Broadway**	**10-334606**	210	0.48	234		2
115	Irons, Rockwell	**7407 S. Broadway**	**10-330601**	210	0.4	151.5	1	
116	Wicks, Douglas F.	**7405 S. Broadway**	**10-328593**	210	0.396	9		1
117	Red Hook Central School	**7401 S. Broadway**	**10-317588**	465	0.794	35		1
118	Universal Builders	**45 O'Callaghan Lane**	**10-282617**	710	8.5	195		1
119	Wilms, Martin	**7398 S. Broadway**	**10-338560**	210	0.57	263	2	
120	Lamic, Inc.	**7393 S. Broadway**	**10-314564**	484	0.22	54		1
		7396 S. Broadway						2
121	Red Hook Soap Factory, LL	**7392 S. Broadway**	**10-324546**	485	1.27	95		1
122	Fell, David	**7391 S. Broadway**	**10-307560**	280	0.234	324	2	
123	Fell, David	**7387 S. Broadway**	**10-299560**	210	0.65	72		1
124	Red Hook Group, LLC	**7385 S. Broadway**	**10-292549**	483	0.32	20		1
125	Red Hook Commons Apartments	**11-15 Laura Lane**	**10-250565**	311	2.55	5000	24.5	
126	Red Hook Commons Apartments	**Laura Lane**	**10-263580**	411	2.42	5000	24.5	
127	Kearney Development	**Laura Lane/Morgan Dr**	**10-312583**	461	0.44			1
		Subtotals					**1**	**53**	**14**

							234		
	Vacant Land								
	Village of Red Hook								
1	Eckelman, Stephen and Marya	**S Broadway Rear**	**10-410710**	311	0.08				0.1
2	Key Bank	**W. Market St.**	**10-407720**	330	0.25				0.1
3	Key Bank	**7475 S. Broadway**	**10-403700**	438	0.42				0.1
4	Haddad, Christian G	**E. Market St**	**10-474721**	311	0.16				0.1
5	Kearney Development (WWTP)	**Laura Lane/Morgan Dr**	**09-205603**	311	12.4				0
6	Kearney Development	**Laura Lane/Morgan Dr**	**10-273554**	311	0.24				0.1
7	Kearney Development	**Laura Lane/Morgan Dr**	**10-302574**	311	0.23				0.1
8	Kearney Development	**Laura Lane/Morgan Dr**	**10-287598**	311	0.33				0.1
9	Kearney Development	**Laura Lane/Morgan Dr**	**10-285569**	311	0.33				0.1
10	Kearney Development	**Laura Lane/Morgan Dr**	**10-262591**	311	0.33				0.1
11	Kearney Development	**Laura Lane/Morgan Dr**	**10-273583**	311	0.31				0.1
13	Colburn, Arnold	**South Broadway Rear**	**13-246435**	311	0.377				0.1
14	Colburn, Arnold	**7345 S. Broadway**	**14-271441**	311	0.1				0.1
			Subtotal				**0**		**1.1**
		Totals					**37**	**121.5**	**170.1**
		EDU Totals	**328.6**						

avg.SF use = 151.5