APPENDIX L
Final Value Planning Report

Revised February 2022

NPV

November 2021
(revised February 2022)

NELSON POPE VOORHIS

ARCADIS

Town of Southampton, NY

Riverside Revitalization Sewage Treatment Plant and Collection System

Value Planning Final Report

ARCADIS

Danielle Baldwin
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Date: November 2, 2021 (revised February 7, 2022)
Our Ref: 30065414
Subject: Final Value Planning Report

Dear Ms. Baldwin:

Arcadis of New York, Inc. is pleased to submit the attached final Value Planning Report to highlight findings from the VE workshop held from September 14-16, 2021. The alternative proposals presented provide solutions addressing the basic project functions and focus on providing clarification of elements that require additional vetting as the project proceeds. Key functional solutions that also provide cost savings include options to transfer either solids treatment or liquid and solids treatment to Riverhead WRRF (requires governance arrangement with Riverhead to make this happen. Riverhead is one of a few options for providing potential solids treatment). Other alternative proposals look at replacing the constructed wetlands with an injection gallery. This Value Planning review was, I believe, a necessary and well-received evaluation of a project that is at the early stages and the ideas and additional clarifications presented will support the Town of Southampton as they progress forward with the full design.

Please do not hesitate to contact me or Matt Yonkin if you have any questions about this report or next steps.

Sincerely,

Arcadis of New York, Inc.

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Enclosure: Final Value Planning Report

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EXECUTIVE SUMMARY

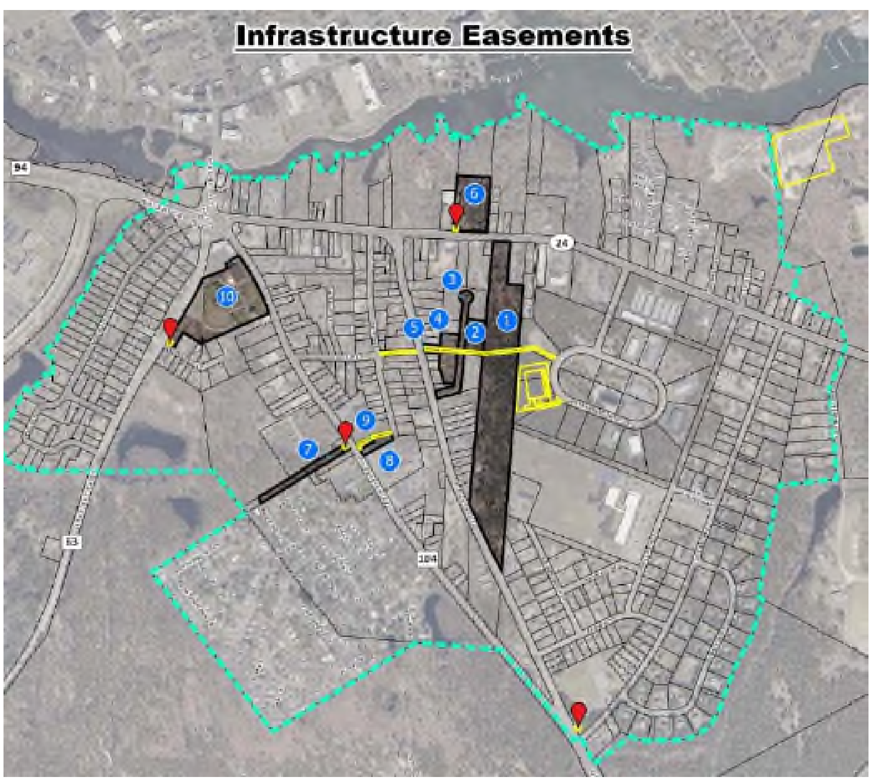
VALUE ENGINEERING STUDY OBJECTIVES

Arcadis of New York, Inc. (Arcadis) conducted a three-day value planning (VP) study of the proposed wastewater collection and treatment system in the Riverside Community of Southampton. The VP study was completed for the New York State Environmental Facilities Corporation (EFC) and for the Town of Southampton (Town) as part of the Environmental Justice (EJ) Hardship Financing process. The project is being developed by Nelson, Pope & Voorhis (NP&V) and was at a conceptual report level of completion. The workshop was conducted at both the Town of Southampton offices and at the Residence Inn in Riverhead from September 14th-16th, 2021. The VP team was tasked with applying the SAVE International® six phase (in-workshop) Value Methodology Job Plan to evaluate the conceptual design submission, prepared by Nelson & Pope dated September 2018, hereinafter referred to as the "baseline concept." The objective of the study was to identify value-improving alternative proposals to the baseline concept that may reduce project costs, project schedule and project risks, and improve project performance.

BASELINE CONCEPT

The following overview of the baseline concept is provided below with more detail contained in Section One of the report:

Figure ES-1 – Overview of Riverside Sewer District



- The proposed design baseline concept as shown pictorially above includes the following concepts:
    - Development of four pump stations to collect and pump collected wastewater to the new sewage treatment plant (STP) sited to reduce excavation depth and minimize impact to high groundwater levels
    - Collection system consisting of gravity collection pipes routed to the four pump stations and force mains from the pump stations directly to the STP
    - STP developed as a Sequencing Batch Reactor (SBR) to treat wastewater and meet effluent nitrogen targets
    - Discharge component is a constructed wetland (CW) sized and designed to handle future wastewater loads and ground-discharge treated wastewater

The estimated construction cost presented was $49.5M in 2018$s (from the 2018 report) and reduced to $42.1M as presented in the Riverside Revitalization VE In-Brief presentation by NP&V. Project construction is expected to occur in 2023.

PROJECT DRIVERS AND CONSTRAINTS

NYS EFC, Town of Southampton, and the design team identified several project challenges and constraints during the pre-workshop call and during the morning in-brief on the first day of the VE study. The following is a compilation of the key concerns/constraints identified:

- Nitrogen and groundwater impacts and discharge concerns
- Environmental concerns leading to siting restrictions due to the Central Pine Barrens protected area

FUNCTION ANALYSIS

The cornerstone of a VE study is the Function Analysis, which evaluates the baseline concept to identify the required functions of the overall project and the functions provided by the major cost drivers. The functions identified are then used by the VE team to underpin all later VE team activities, including the brainstorming of creative ideas to identify better ways to accomplish the same desired functionality at a lower cost or a shorter project duration, lower risk, and/or improved performance. The following are the key project functions identified during this phase of the Job Plan (the complete list of functions is included in Section Two of the report):

- **Revitalize Economy** (Need or Higher Order Function)
- **Improve Quality of Life** (Need or Higher Order Function)
- **Convey Wastewater** (Purpose or Basic Function)
- **Reduce Nitrogen Discharges** (Purpose or Basic Function)

STUDY RESULTS

Based on the project's intended functions, 18 alternatives were generated and evaluated to address the key functions (some noted above and more in the main text of this report). Ultimately, the VE team proposed 9 recommendations consisting of four VE alternatives (with quantifiable value impacts) and five design suggestions (with qualitative value impacts or cost increases). One caveat to our analysis, options presented below include potential for transferring liquid and/or solids treatment to Riverhead WRRF. However, Riverhead may not be the only option (it is the closest option) for consideration and the analysis applied to transferring solids or liquids treatment to Riverhead (Proposal Nos. TP-7, TP-8 and TP-10) could apply to other locations like Bergen Point or Patchogue, with some additional cost ramifications occurring. The following table summarizes the VE alternatives/suggestions as developed by the VE team (more detail provided in Sections 4 and 5 of the report):

Table ES-1 – Recommended Proposals

PRO. NO.	ALTERNATIVE DESCRIPTION	LIFE-CYCLE COST SAVINGS (PRESENT WORTH)	CONSTRUC-TION SCHEDULE CHANGE	IMPLEMEN-TATION DECISION
CW-1	Provide injection gallery in lieu of constructed wetlands	$918,000	Minor reduction	Further Study
CW-2	Evaluate proposed constructed wetland location for potential constraints	DESIGN	SUGGESTION	Further Study
TP-5	Confirmation of liquid and solids treatment/process assumptions and calculations	DESIGN	SUGGESTION	Further Study
TP-7	Expand and confirm biosolids management at Riverhead WRRF	DESIGN	SUGGESTION	Further Study
TP-8	Incorporate a gravity belt thickener at the plant to reduce sludge volume and subsequent sludge management costs assessed by Riverhead	$330,000	Minor Increase	Accepted
TP-10	Expansion of Riverhead WRRF and Riverside flow diversion	$1,370,000	Significant Impact	Further Study
TP-11	Remove generator room from new treatment plant building and place outside of the building and repurpose space	DESIGN	SUGGESTION	Accepted
CS-1	Relocate pumping stations to lower-lying areas to reduce excavation depth	$303,000	No impact	Further Study
CS-2	Provide gravity sewer near STP in lieu of force mains to influent STP pump station	DESIGN	SUGGESTION	Further Study

The most significant proposals address the following improvements:

- Ensuring Riverhead can take either the solids stream or both the liquid and solids stream allowing Riverside to focus on residential connections and the collection system (Pro. Nos. TP-7 and TP-10)
- Adding a gravity belt thickener at Riverside to reduce the volume of solids by 90% with a payback period leading to this being a positive dollar impact despite outlaying additional capital (Pro. No. TP-8)
- Siting and using an injection gallery system in lieu of the planned constructed wetlands (Pro. No. CW-1)

CONSIDERATIONS AND ASSUMPTIONS

In the preparation of this report, and the alternatives and design suggestions that were developed, the VP team made some assumptions with respect to conditions that may occur in the future. In addition, the VP team reviewed the project documentation, relying solely upon the information provided by the designer, and relying on that information as being true, complete and accurate. This summary of considerations and assumptions should be reviewed in connection with this entire report:

- The alternatives and design suggestions rendered herein are as of the date of this report. Arcadis U.S. assumes no duty to monitor events after the date, nor have a duty to advise or incorporate any new, or previously unknown technology into the alternatives or design suggestions.
- The Arcadis U.S. report is based upon the presumption that there are no material documents affecting the design or construction costs that the VP team has not seen. The existence of any such documents may alter the alternatives and design suggestions contained herein.
- Arcadis U.S. is not warranting and expressly disclaims all warranties and liabilities for the feasibility of these alternatives and design suggestions, as well as the advisability of their implementation (ideas proposed have been utilized on other projects but each project is different). It is the Town of Southampton and their design consultant team's sole responsibility to explore the technical feasibility of the alternatives and design suggestions, and to make the determination of implementation on this project.

SECTION ONE INFORMATION PHASE

INTRODUCTION

Arcadis conducted a three-day value planning (VP) workshop of the proposed wastewater collection and treatment system in the Riverside Community of Southampton. The workshop was conducted at both the Town of Southampton offices and at the Residence Inn in Riverhead from September 14th-16th, 2021. An agenda for the workshop and workshop timing is provided in Appendix A. Participants in the overall workshop study (main team on-site and reach back support) and report development include the following:

PARTICIPANT	DISCIPLINE	AFFILIATION
Michael Kosier, PE, Assoc. DBIA	Facility and Civil Engineer	Arcadis U.S., Inc.
Michael Lynch, PE	Process Engineer	Arcadis U.S., Inc.
William Wollman	Ecologist	Arcadis U.S., Inc.
Steven Feldman, PG, LEP, CPH*	Hydrogeologist	Arcadis U.S., Inc.
Richard Gilmour, AICP, PP*	Planner	Arcadis U.S., Inc.
Joe Husband, PE, BCEE*	Senior Wastewater Technical Advisor	Arcadis U.S., Inc.
Russ Mereo*	Cost Estimator	Arcadis U.S., Inc.
Doug Partridge, PWS, CE*	Wetlands Ecologist	Arcadis U.S., Inc.
Rob Porsche*	Geologist	Arcadis U.S., Inc.
Anthony Dunams, PE, CVS	VE Project Manager and Facilitator	Arcadis U.S., Inc.
Matt Yonkin, PE, CEM	QA/QC Review and Program Manager	Arcadis U.S., Inc.

** - remote resource*

The VP workshop was carried out following the standard SAVE International® VE Job plan consisting of six-phases (during the workshop, eight phases overall with pre-workshop and implementation efforts done before and after the workshop, respectively) as promulgated in the United States Environmental Protection Agency's guidelines for conducting a VE study, as noted below:

- Information Phase (including pre-workshop document review, a field visit at the end of Day One and a presentation by the project design team)
- Function Phase
- Creativity Phase
- Evaluation Phase
- Development Phase
- Presentation Phase (VP team's out-brief presentation and final report)

This VP study report documents the execution of the VE Job Plan during the workshop.

INFORMATION GATHERING PHASE

The first phase of the VE Job Plan is for the VP team to become familiar with the project. Prior to the workshop, key staff from Arcadis coordinated a preparation call with representatives from the EFC, the Town, and NP&V to review the goals of the study and project criteria – this call was held on September 10, 2021. Critical items discussed during the call include the following:

- Nitrogen and groundwater impacts and discharge concerns
- Environmental concerns leading to siting restrictions due to the Central Pine Barrens protected area
- Ensure the employment of the best viable and implementable treatment technology

The VP team also prepared by reviewing the following background documents, at a minimum, with other documents also provided and reviewed:

- Riverside Revitalization Sewage Treatment Plant – Clean Water State Revolving Fund (CWSRF) Engineering Report, Town of Southampton, Riverside, New York; prepared by Nelson & Pope; dated September 2018

As part of the preparation for the workshop, the facilitator used the current Cost Estimate to prepare a cost model reflecting the semi-final design estimate of $49.5M (this is in 2018$s or approximately $53.9M in 2021$s with a 8.9% escalation markup) demonstrating how the costs are allotted to the various project elements. The cost model is described in Section Two of this report. The construction improvements are planned to begin sometime in 2023. Cost estimate was updated by Nelson & Pope in 2021 with the revised costs for collection system and treatment plan equaling $42.1M (in 2021$s).

The workshop was then kicked off with a presentation of the project by representatives from NP&V. The VP Team, as well as representatives from the EFC, the Town and other involved stakeholders were in attendance. The purpose of the presentation was to expand on the information contained in the provided documents and share additional project information that may not have been fully reflected in the previous documents. This was an interactive session that allowed VP team members to ask questions of the Project Design Team and representatives present to enhance understanding of the project. Those attending the kick-off meeting are listed on the sign-in sheet in Appendix B.

PROJECT DESCRIPTION

The following is taken from the NP&V Revitalization CWSRF Engineering Report:

<u>Location</u>:

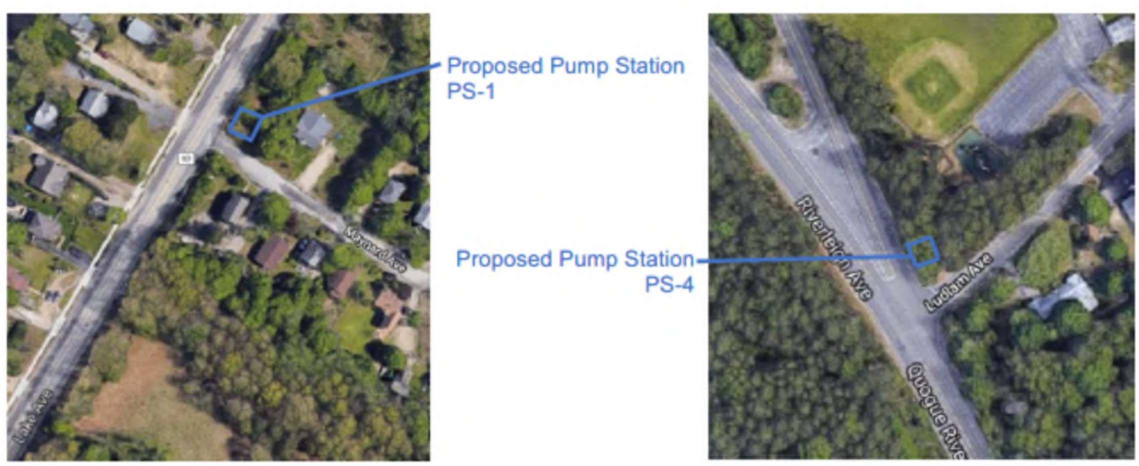
It is suggested that the gravity collection system trunk lines be located within the road right of ways and the pump stations be located on dedicated portions of existing lots. Each dedicated area will require approximately 1,225 square feet of area for all equipment, controls and accessories. The Pump Stations will be located on the lots designated as Suffolk County Tax Map (SCTM) Numbers 0900-138-02-29.1, 0900-118.1-1-4, 0900-139-02-70.1, and 0900-140-02-57.1. Since these lots are not currently owned by the Town, the required areas will need to be assessed for taking.

It is suggested that the proposed sewage treatment plant (STP) be located on a dedicated area consisting of two lots totaling 2.64 acres and designated as the Suffolk County Tax Map (SCTM) Numbers 0900-141-01-9.31 & 9.32. The lots are currently undeveloped and unimproved. Due to proximity to freshwater and tidal wetlands, the constructed wetlands will span across three separate lots to the north. These lots are designated as SCTM Numbers 0900-118.1-01-32 (5.93 Acre) and 0900-119-01-26.1 (34.49 Acre). See the attached Overall Site Plan and STP Site Plan for map of the two locations. The STP discharge constructed wetland area is an existing dredge spoils location.

Figure 1 – Overview of CW / STP / PS-2 Locations

Source: Google Aerial view (accessed September 7, 2018)

Figure 2 – Overview of PS-1 and PS-4 Locations



Source: Google Aerial view (accessed May 4, 2018)

Source: Google Aerial view (accessed May 4, 2018)

Figure 3 – Overview of PS-3 Location

Source: Google Aerial view (accessed May 4, 2018)

General Concept Description:

The intent of the project is to construct the necessary sanitary infrastructure and a centralized sanitary treatment facility to service the entire community of Riverside. The infrastructure would consist of a gravity collection system as well as pump stations and force mains. The STP would need to be capable of secondary treatment. All of the systems would need to be designed and constructed according to the Suffolk County Sanitary Code (SCSC) as well as the local guidelines put into place such as the Peconic Estuary Program (PEP). The conveyance systems would collect sanitary flow from the entire community and ultimately discharge into the proposed STP. Since there is no current sanitary infrastructure or centralized treatment facility in place for the community, the only options are to either build or not build. Therefore, after a brief description of alternatives, one was selected and is the focus of this report to be utilized for the community. Since there is no municipal facility in place currently, there will be no impact by the construction of the one proposed.

As stated above and in the draft GEIS (DGEIS) by NP&V, the existing concentration of nitrogen in recharge within the study area is estimated to be 4.58 mg/l, and the concentration within the Central Pine Barrens portion is 4.83 mg/l. Per the study conducted by NP&V and their proprietary model (SONIR) the concentrations in the study area and Central Pine Barrens portion of the study area with a centralized wastewater treatment facility would be approximately 4.12 mg/l and 4.55 mg/l respectively. That relates to a 10.04% reduction of nitrogen concentration in the overall study area and 5.80% reduction of nitrogen concentration in the Central Pine Barrens portion of the study area. This further illustrates the positive environmental impact that the construction of the infrastructure and STP will have.

Also, due to available site area, the most feasible discharge type available is to build Constructed Wetlands (CW). A standard ten-foot (10’) diameter leaching pool with appropriate setbacks would require approximately 324 square feet of space. Considering the regulations of the Suffolk County Department of

Public Works (SCDPW) and Suffolk County Department of Health Services (SCDHS) and their requirement of installing 200% with 100% space available for expansion, the design flow for the community would require approximately three hundred twenty (320) 10’ by 16’ effective depth leaching pools which would require 103,680 sf (2.38 acres) at construction. This area would need to be removed from the proposed revitalization area and secured for the sole purpose of effluent leaching.

Therefore, it is the intent of this project to redevelop a current dredge spoils site into Constructed Wetlands near the Peconic River. The constructed wetlands will provide two community benefits in that it will convert a current unsightly barren area into natural wetlands area in communion with the current use and will also provide significant nitrogen removal for the service area.

Under current design conditions, we estimate that 3.67 acres of wetland area will be reconstructed. SCDHS and SCDPW currently require 100% expansion area for the leaching facilities. The challenge that a wetland provides is that since they are considered a living machine, it will be hard to sustain plant growth in the reserve land area. Thus, this action will need a waiver from the requirement but dedicate the area for future leaching use. More importantly, the reconstructed 3.67 acres will be further used for passive use in the community after the wetland area is established.

The different options available to consider that will allow some level of revitalization within the community include conventional disposal systems, collection and pump station system to a nearby existing treatment facility, and collection and pump station system to a new treatment facility within the community. The different process technologies that were investigated to treat the wastewater from the community include the Biologically Engineered Single Sludge treatment (BESST), Membrane Bioreactor (MBR) treatment and Sequencing Batch Reactor (SBR) treatment technologies. In addition, two supplemental sludge reduction facilities were considered.

Recommended Concept:

During the investigation of possible sewage treatment plant processes, NP&V investigated SBR, MBR and BESST technologies. During our process investigations of the technologies, SBR was the only available technology that can provide the operational flexibility to provide both secondary and tertiary treatment without major capital changes to the facility. Installing mixers provides the secondary treatment and the proposed plant will be of sufficient size to accommodate filters for tertiary treatment. Also, research into the Janicki processes proved that the proposed STP plant would not produce enough sludge to make the S200 unit self-sustainable. Also, the proposed STP would not generate enough sludge to optimally operate either the S200 or VRD unit, which would make either installation not economically feasible.

Because the SBR process operates on a timed cycle, all the equipment is on-site to convert from secondary treatment primarily through software changes. No additional equipment will be required to implement a tertiary treatment process operation. Additionally, the SBR process is not susceptible to plug loading and will not be vulnerable to hydraulic overflow. The SBR technology process system is designed such that variations in the quantity of inflow from the development will be equalized prior to the process tanks, allowing for proper process cycle times at all times.

We identified the ability of the proposed treatment plant to provide flexible process operation as key in the process selection because of the need to augment the CW Total Nitrogen removal. We see the possibility of having to provide conventional Nitrogen removal during the winter months. This is typically a low growth season, and thus the CW may not provide the needed degree of treatment.

The recommended solution is a wastewater treatment plant (WWTP) utilizing the Sequencing Batch Reactor (SBR) Technology. The plant will be designed in accordance with Suffolk County Department of Health Services, Suffolk County Department of Public Works, and the U.S. Environmental Protection Agency regulations.

Since denitrification is proposed to take place outside the primary process area, located at the constructed wetland area to the north, the cycle times for the process tanks will be less than typical SBR process units. The operators that will be employed at the proposed STP will monitor all the conditions including the nitrogen loading of the effluent. Should the denitrification process at the constructed wetlands become insufficient at any time, it would be relatively simple to convert the process tanks and control panels to accommodate for denitrification at the plant location as well. Also, space is reserved within the STP envelope for the future addition of effluent filters that will further evolve the STP to a tertiary treatment facility.

Due to the lack of existing sanitary infrastructure and since most of the community is not currently developed to its fullest potential, the existing sanitary flow is considerably less than what is expected for revitalization. The closest existing treatment facility is the Riverhead STP, which does not have the capacity to accept the full flow of the revitalized community. To install a force main network beyond this location will greatly increase the price of construction and maintenance costs. Therefore, it is recommended that the best course of action for the community to begin the revitalization process is to construct sanitary infrastructure which terminates at a new sewage treatment facility.

The community will be broken into several sanitary sub-districts which will collect the flow via the gravity system to the local pumping stations. The pump stations will be designed to handle the full flow of the subdistrict with a peaking factor. Since the revitalization process will take place over time, it is recommended to equip the pump stations with variable frequency drives to adjust the flow rate of the pumps as the community develops. Also, since it is in the best interest of the community to discharge the sanitary wastewater to a facility within the community, the overall cost of the pump stations and force mains will be minimized.

The SBR technology is highly adaptive to various flow scenarios, and therefore can be easily adjusted from the controller to accommodate the different flows that the proposed STP will see throughout the revitalization process of the community. The cycle times for adequate treatment will be adjusted at the controller when the influent flow is modified to accommodate the newly developed areas while maintaining effluent concentration criteria.

Also, the proposed STP layout was considered such that only a portion of the plant would be required at the time of initial construction. The layout considers the use of four treatment trains to handle the full 900,000 GPD flow. The Town could entertain the concept of phasing the construction of the STP in line with the revitalization of the community. Only two of the four basins would be required for the initial influent flow, and the second pair of tanks could be constructed later when the community would require the additional capacity. The layout of the four tanks has been placed in such a way to allow for the construction of two trains at a later date without negative impact to the existing two trains.

SBR Description:

The SBR System will be a four-train system consisting of the following:

- An Influent Pump Station to convey raw sewage to the mechanical screen
- One (1) Mechanical Fine Screen
- Two (2) 128,850-gallon Equalization Tank

- One (1) Influent Splitter Box
- Four (4) 402,843-gallon Sequencing Batch reactors
- Four (4) 165,876-gallon Sludge Holding Tanks,
- Two (2) 85,191-gallon Intermediate Surge Tanks
- One (1) Effluent Flow Metering Chamber
- SBR Aeration System consisting of three (3) aeration tank blowers, three (3) sludge holding tank blowers, two (2) influent equalization tank blowers, and all associated diffusers and piping.
- Electrical Equipment
- Chemical Feed System for pH control and supplemental carbon
- An effluent Pump Station to convey the treated wastewater to a constructed wetland located approximately 1,300 feet north of the STP building
- One (1) Stand-by Generator
- Constructed Wetlands Area Development (±3.67 Acres)

Selected drawings from the designer’s conceptual report submission showing key elements of the project are included in Appendix C.

SECTION TWO FUNCTION PHASE

A fundamental element of the Value Methodology is the Function Phase. Function is defined as the intended use of a physical or a procedural element using an active verb and measurable noun sometimes augmented with an adjective for clarity (this construct allows for a succinct descriptor of what the project is meant to do and later solutions for addressing that function are determined and evaluated). Function analysis is a means of evaluating a project to see if the expenditures perform the requirements of the project or if there are disproportionate amounts of costs spent on support functions or unwanted secondary functions. Elements performing support functions add cost to the project but have a relatively low worth to the basic function.

Having gained some information about this project, the VE team proceeded to define the functions provided by the project, identifying key high order functions and basic functions, identifying the costs to provide these functions, and determining whether the value provided by the functions has been optimized. To accomplish the function analysis, the team first looked at the project in its entirety and randomly listed its functions, and, if needed, looked at the high-cost drivers of the project noted on the Cost Histogram described below and evaluated what function those high-cost items provide.

Higher order, basic and required secondary functions provide value, while secondary and unwanted functions tend to reduce value. The goal of all VE studies is to optimize the value of the basic functions and reduce the impact of unwanted or unnecessary secondary functions and thereby enhance project value.

Table 1 – Function Determination

Area of Focus	Function		Function Type
	Active Verb	Measurable Noun	
Overall Project Functions	Revitalize	Economy	Higher-Order
	Promote	Growth	Higher-Order
	Improve	Quality of Life	Higher-Order
	Reduce	Nitrogen Discharges	Basic
	Improve	Water Quality	Higher-Order
	Protect	Environment	Higher-Order
	Collect	Wastewater	Lower-Order
Constructed Wetlands	Discharge	Wastewater	Basic
	Engage	Stakeholders	One-Time
	Provide	Park Features	All-the-Time
SBR STP	Treat	Wastewater	Basic
	Revitalize	Economy	Higher-Order
	Eliminate	Decentralized Treatment/LF	Higher-Order
STP Concrete	Hold	Wastewater	Secondary
	Retain	Wastewater/Sludge	Secondary
	Provide	Treatment Volume	Secondary

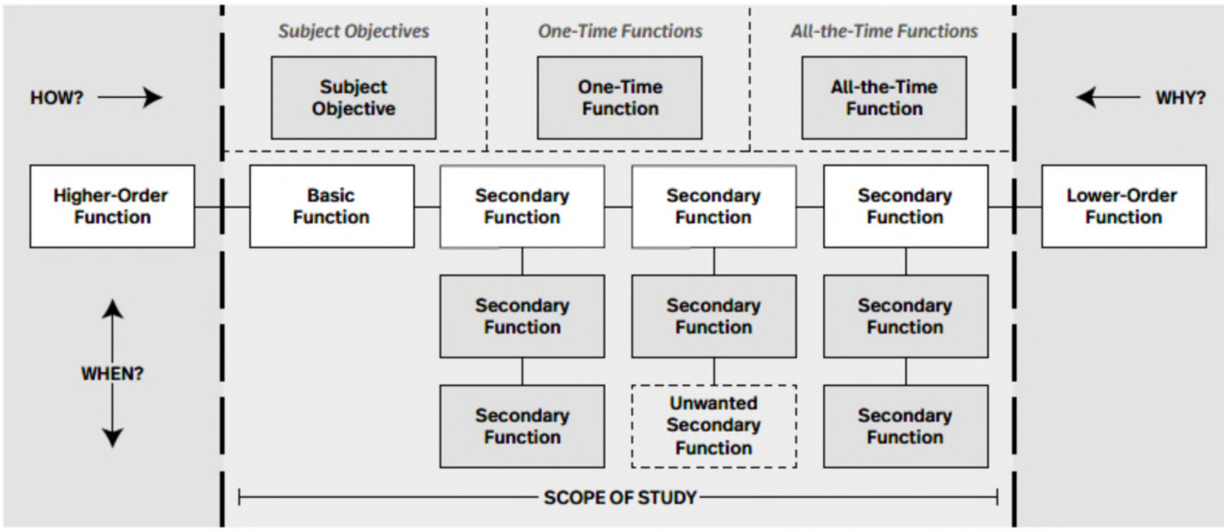
Area of Focus	Function		Function Type
	Active Verb	Measurable Noun	
	Protect	Groundwater	Secondary
Collection System	Collect	Wastewater	Lower-Order
	Convey	Wastewater	Basic
Electrical System	Power	Plant/Pump Stations	Secondary
	Control	Plant/Pump Stations	Secondary
STP Piping and Mechanical	Control	Flow	Secondary
	Convey	Flow	Secondary
Collection System Force Main	Convey	Flow	Secondary
	Minimize	Excavation	Secondary
Collection System Pump Stations	Increase	HGL	Secondary
	Convey	Flow	Secondary

FAST Diagram

The below general diagram (taken from SAVEs 2020 VM Guide – A Guide to the Value Methodology Body of Knowledge) highlights the key functions and how they are linked. Higher-order functions represent the need(s) of the project being evaluated and is the reason why this project exists. Lower-order functions represent the input side of the project that the project must deal with or address. Generally, think of lower-order functions as inputs and higher-order functions as outputs. Basic functions represent the purpose of the project under study and for this and all projects to be a success the basic function has to be achieved to gain a valuable solution to the project being addressed. Secondary functions portray the approach or path of needs to satisfy the basic function. Lastly, one-time functions are secondary functions that, yes, happen once and then that function is completed while all-the-time functions are also secondary functions, but these functions occur continuously.

The main concern that the workshop team is cognizant of is developing functions which have open-ended solutions versus developing activities which are specific and do not lead to further open-ended solutions. For example, Build SBR is an activity and not open for creativity in solving the wastewater treatment problem, but Treat Wastewater is open-ended and wastewater could be treated by a SBR, a MBR or other options. Functions drive solutions, activities drive a prescribed solution with no leeway to recommend alternative approaches.

Figure 4 – Structure of a FAST Diagram (from SAVE 2020 VM Guide)



Cost Model

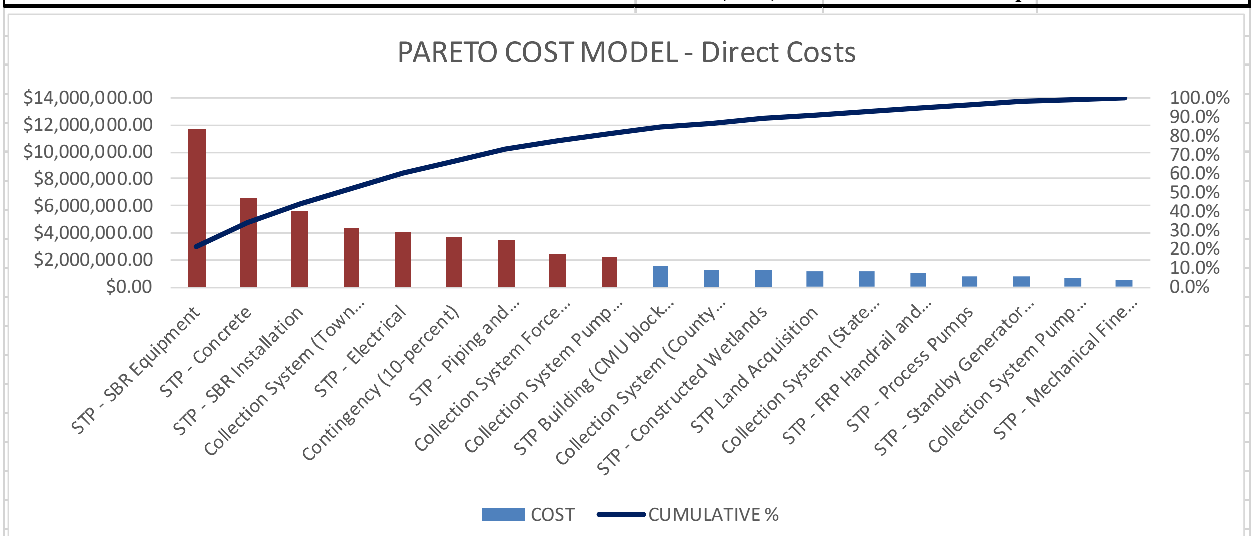
The Cost Histogram (Pareto Table) for this project, in both tabular and graphical form, illustrates those construction elements that comprise most of the project's cost. The overall direct construction costs from the cost estimate is $49.5M including $3.7M in contingencies (in 2018$s). This cost estimate was escalated by 8.9% to provide costs in 2021$s leading to the total project cost being around $53.9M (this equates to $45.8M if using the cost estimate NP&V provided at the VP In-Brief presentation on September 14, 2021) for both the collection system and the treatment and discharge system. Treatment system costs seem high for this project, but we recommend leaving the price point where it is at until further design refinement occurs. Our initial thoughts are that the treatment cost as contained in the 2018 Report is potentially $5-10M higher than expected.

The items in bold letters on the Cost Histogram represent approximately 80% of the project's cost. Because of the absolute magnitude of high-cost elements, these high-cost items also became initial targets for value enhancement. The individual function(s) of the major components of the project depicted on the cost histogram were identified and confirmed with the above function identification.

Table 2 – Cost Evaluation

COST HISTOGRAM

PROJECT ELEMENT	COST	PERCENTAGE	CUMULATIVE %
STP - SBR Equipment	**$11,652,300.00**	**21.6%**	**21.6%**
STP - Concrete	**$6,642,900.00**	**12.3%**	**34.0%**
STP - SBR Installation	**$5,553,900.00**	**10.3%**	**44.3%**
Collection System (Town Road) - 26402 LF	**$4,312,766.70**	**8.0%**	**52.3%**
STP - Electrical	**$4,029,300.00**	**7.5%**	**59.7%**
Contingency (10-percent)	**$3,718,935.00**	**6.9%**	**66.7%**
STP - Piping and Mechanical (internal to STP alone)	**$3,375,900.00**	**6.3%**	**72.9%**
Collection System Force Main - 10,810 LF	**$2,354,418.00**	**4.4%**	**77.3%**
Collection System Pump Stations - 4 total	**$2,178,000.00**	**4.0%**	**81.3%**
STP Building (CMU block walls, concrete roof, etc..)	$1,579,050.00	2.9%	84.3%
Collection System (County Road) - 6690 LF	$1,274,946.75	2.4%	86.6%
STP - Constructed Wetlands	$1,252,350.00	2.3%	89.0%
STP Land Acquisition	$1,149,984.00	2.1%	91.1%
Collection System (State Road) - 5000 LF	$1,089,000.00	2.0%	93.1%
STP - FRP Handrail and Grating	$980,100.00	1.8%	94.9%
STP - Process Pumps	$816,750.00	1.5%	96.4%
STP - Standby Generator with Automatic Transfer Switch	$816,750.00	1.5%	98.0%
Collection System Pump Stations Land Acquisition - 3600 SF	$609,840.00	1.1%	99.1%
STP - Mechanical Fine Screen	$490,050.00	0.9%	100.0%
SUBTOTAL	$53,877,240		
OVERALL TOTAL	**$53,877,240**	**Overall Markup:**	



SECTION THREE CREATIVITY AND EVALUATION PHASES

CREATIVE PHASE

This VP study phase involves the creation and listing of alternative proposals to potentially enhance the value of the project. Starting with the functions or project elements with a high absolute cost compared to other elements in the project and secondary functions providing little or no value, the VP team began to generate as many alternatives as possible to perform the necessary project functions optimally at a lower total life cycle cost, at a higher level of performance or to improve the quality of the project. Alternatives for improving operations and maintenance, reducing project risk, and simplifying constructability were also encouraged. A Creative Alternatives and Evaluation worksheet was generated and is provided below.

The alternative proposals generated were categorized into three functional areas – those associated with the constructed wetlands discharge system, with the treatment plant, and with the collection system. Recommended proposals targeted modified ideas compared to the baseline concepts as well as design suggestions associated with the current baseline concept as more of additional thoughts to consider when the PDT continues on the path to employ what is contained in the baseline concept depicted in the 2018 Engineering Report.

Each proposal generated was given a number to track it through the remaining value engineering process and facilitate referencing among the Creative Alternatives and Evaluation table, the proposal write-ups, and the Summary of Value Engineering Alternatives table.

EVALUATION OF ALTERNATIVE PROPOSALS PHASE

In this phase, each proposal generated in the Creative Phase is fully evaluated and rated based on its ability to respond to the project's value objectives and is worthy of additional research and development before being presented to the EFC, the Town, and the PDT. EFC's value objectives were identified during conversations at the workshop kickoff meeting and the pre-workshop meeting. The following value objectives were identified:

- Revitalizes the economy
- Reduces nitrogen discharges
- Employs best available technology
- Provides resilient infrastructure
- Provides additional public space/features
- Employs a complete one-water solution
- Serves, benefits, or protects an environmental justice area

Based on the team's understanding of the EFC's value objectives, each alternative proposal was compared with the present baseline design concept regarding the above value objectives and the advantages and disadvantages of each recommended proposal were discussed. How well the alternative met the above design criteria was also reviewed. Based on the results of the analysis, the VP team rated the alternative proposals by consensus using a scale of 1 to 5, with 5 or 4 indicating a proposal with the greatest potential to be technically sound and provide cost savings or improvements in other areas of the project, 3 indicating a proposal that provides marginal functional value but could be used if the project was having budget/financial problems (e.g. more of a cost cutting alternative), 2 indicating a proposal with a major technical flaw, and 1 indicating a proposal that does not respond to project requirements/criteria at all. Generally, proposals rated a 3, 4 or 5 are pursued in the next phase and presented to the owner during the Presentation Phase.

The team also used the designation "DS" to indicate a design suggestion, which is a proposed alternative that may not have specific quantifiable cost savings but may reduce project risks, improve constructability, help to minimize claims, enhance operability, reduce maintenance, reduce project schedule, or enhance project value in other ways. Design suggestions could also increase a project's cost but provide value in areas not currently addressed by the baseline concept. DSs will be further developed ahead in the next phase of the VE workshop process.

The evaluation of the ideas is recorded in the right column of the Creative Idea Listing and Evaluation table below:

Table 3 – Creative Alternative Proposals Listing and Evaluation Table

Alt. No.	Alternative Proposal Description	Rating
	CONSTRUCTED WETLANDS (CW)	
CW-1	Provide injection wells with disinfection, if needed, in lieu of constructed wetlands (sited at treatment plant or at the current CW site) and repurpose public space	4
CW-2	Evaluate CW site for issues such as contaminated soils, existing wetlands, flood zone, application area, maintenance, constructability, resiliency (berm) and percolation rates	DS
CW-3	Phasing of CW to match flow regime expected incorporating split cells or revised plant mix	Combine w/ CW-2
CW-4	Utilize CW parcels for mitigation wetlands	Combine w/ CW-2
	TREATMENT PLANT (TP)	
TP-1	TKN removal based on treatment plant reductions not from constructed wetlands removal	Combine w/ TP-5
TP-2	Provide additional alkalinity to ensure nitrification at the outset of the project	Combine w/ TP-5
TP-3	Consider carbon source to ensure desired TKN removal target of 5-7%	Combine w/ TP-5
TP-4	Based on sludge analysis, sludge production has been overestimated leading to larger pumps and material to be transported	Combine w/ TP-5
TP-5	Evaluation of treatment assumptions and calculations - alkalinity, carbon, sludge production, sludge retention time, and sludge storage	DS
TP-6	Solids handling modifications evaluated to ensure Riverhead can handle solids load at their headworks	Combine w/ TP-5
TP-7	Provide an expansion at Riverhead to provide additional solids processing and disposal (could include a GBT at Riverside) and confirm solids not loaded at the Riverhead headworks	DS

Alt. No.	Alternative Proposal Description	Rating
TP-8	Incorporate a gravity belt thickener (GBT) at the plant to reduce sludge volume and trucking/disposal costs	4
TP-9	Consider addition of a grit removal system	Combine w/ TP-5
TP-10	Expand Riverhead plant in lieu of new plant in Riverside community and collect wastewater and pump from Riverside	5
TP-11	Revise layout of treatment plant building to incorporate more efficient use of space	DS
	COLLECTION SYSTEM (CS)	
CS-1	Consolidate two to three pump stations on the western side of the Riverside district	5
CS-2	Combine force mains in lieu of separate force mains from each PS west of the plant	3
CS-3	Switch to gravity sewer near the STP	Combine w/ CS-2

SECTION FOUR DEVELOPMENT PHASE

During the VP workshop, many ideas for project value enhancement were conceived and evaluated by the VP team for technical feasibility, applicability to the project, relative ease of implementation considering the project's status, and the ability to meet the EFC's and other stakeholders' project and mission value objectives noted in the previous section of the report. Research performed on those ideas considered to have value-enhancing potential resulted in the development of several individual alternative proposals.

The VE alternatives proposed are presented on the following pages. Each alternative is developed by describing the baseline concept to which an alternative concept proposes a change, the proposed change, a listing of advantages and disadvantages in implementing the alternative, discussions of implementation considerations and schedule and risk impacts, changes in performance from the baseline concept, a rough order of magnitude cost comparison, and sketches depicting the proposed change, if applicable.

Cost Comparison

The capital cost comparisons used unit quantities contained in the conceptual cost estimate prepared by NP&V. If unit costs were not available, published databases, such as the one produced by the RS Means Company, an Arcadis or a team member's or owner's database were consulted. In some instances, direct quotes from vendors for equipment items were also obtained. All cost comparisons are made to provide a like comparison so that cost data reflects a true comparison to the baseline concept.

VE PROPOSAL CW-1

PROVIDE INJECTION GALLERY IN LIEU OF CONSTRUCTED WETLANDS

Alternative Summary	
Total Potential Cost Avoidance:	$918,000
Change in Schedule:	Expected significant reduction in construction schedule (8 weeks schedule reduction)

1. **Description of Baseline Concept:** The design documents state that treated flow from the sewage treatment plant will be conveyed and discharged into constructed wetlands. The proposed constructed wetland footprint is approximately 3.5 acres and located along the Peconic River on undeveloped parcels historically used for dredge spoils. Treated effluent will be conveyed to the constructed wetland via a force main.

2. **Description of Alternative Concept:** Eliminate the need for a constructed wetland by discharging treated water via injection gallery behind the current STP plant building (or over a few locations).

3. **Advantages:**
   - Reduces construction requirements of constructed wetland and force main
   - Eliminates permitting and regulatory constraints, maintenance, and constructability concerns associated with constructed wetland
   - Reduces risks and costs associated with long term stewardship of constructed wetland
   - Reduces handling and disposal of potentially contaminated soils from proposed constructed wetland location

- Engagement with stakeholders and environmental groups would be lessened as wetland landscape would not be created in historically disturbed area

4. **Disadvantages:**
   - Injection gallery configuration would require at least 12 wells to adequately distribute water, which may create space and regulatory constraints
   - The Lloyd aquifer is the sole water source for many communities and would need to be avoided (need to discharge to the Magothy aquifer)
   - Further determination needed if an injection gallery requires disinfection with confirmation provided by DEC and Suffolk County

5. **Discussion:** Due to on-site tidal and freshwater wetlands, regulated wetland adjacent areas, mapped threatened and endangered species, the FEMA 100-year flood zone, projected sea level rise, and potential on-site contamination, the proposed constructed wetland will be challenging from a regulatory and constructability standpoint. Additionally, the constructed wetland will require significant maintenance over the course of its lifespan. As proposed, the constructed wetland is not necessary to meet anticipated nitrogen reduction requirements but would function primarily as a discharge point for treated wastewater. Discharging via injection gallery would alleviate many regulatory, constructability, and maintenance concerns while providing a resilient alternative to a constructed wetland. Additionally, the parcels where the constructed wetland is proposed could still be utilized for natural habitat restoration and green space in order to engage stakeholders and the general public.

6. **Discussion of Schedule Impacts:** By eliminating the constructed wetland, the overall project schedule should improve as regulatory hurdles would potentially be avoided and permitting time would be reduced. Additionally, construction duration would be reduced by eliminating the constructed wetland and force main.

7. **Discussion of Risk Impacts:** Groundwater elevation may be a limitation on injection wells and cause groundwater mounding and flood the ground surface. The injection wells would require ongoing maintenance and the system would need to be able to operate if some wells go off line. However, given the relatively small volume of flow, significant mounding may not be as significant of an issue as it would be for a larger STP.

8. **Discussion of Operating Cost Impacts:** Injection wells will be more energy intensive than a constructed wetlands. Ongoing maintenance costs for the injection wells may be comparable to a well-maintained constructed wetlands. It is assumed that the injection well system will consume about $12,000 kWh/year more of electricity than the constructed wetlands.

9. **Assumptions driving Cost Calculations:**
   - Assume that the injection gallery could take place adjacent to proposed sewage treatment plant and would not require a force main.
   - Assume that anticipated flow is 800,000 gpd
   - Assume 12 wells needed (includes built in redundancy for when wells need to be taken offline for any maintenance/startup issues)

VE PROPOSAL CW-1

PROVIDE INJECTION GALLERY IN LIEU OF CONSTRUCTED WETLANDS

- Cost estimate only pertains to 100’ deep vertical wells. A gallery of 3-5’ deep perforated horizontal pipes spread over two acres within a gravel packed network would also achieve recharge without groundwater mounding. However, a gallery of 100’ deep vertical wells is recommended due to space constraints.

Cost Evaluation

Construction Item (Contract Costs)			**Original Estimate**			**Alternative Estimate**		
Project Item		**Units**	**Qty**	**Unit $**	**Total**	**Qty**	**Unit $**	**Total**
Proposed								
Force Main (Approx 10,810 LF)		LF	4400.0	200.00	$880,000.00			$0.00
Constructed Wetlands		LS	1.0	1,150,000	$1,150,000.00			$0.00
					$0.00			$0.00
Alternative								
8" Diameter Vertical Wells		LF			$0.00	1200.0	76.70	$92,040.00
Drill Rig		HR			$0.00	100.0	606.32	$60,632.00
Vertical Well Screens		LF			$0.00	1200.0	356.55	$427,860.00
Gravel Pack		LF			$0.00	1200.0	65.31	$78,372.00
Well Development		HR			$0.00	100.0	932.00	$93,200.00
HDD: 8" Fusible PVC Pipe		LF			$0.00	1200.0	75.00	$90,000.00
Aggregate Base		CY			$0.00	534.0	51.77	$27,645.18
Mobilization		LS			$0.00	1.0	43,487.00	$43,487.00
Prime Overhead		LS			$0.00	1.0	173,950.00	$173,950.00
Engineering		LS			$0.00	1.0	65,231.00	$65,231.00
Construction Management		LS			$0.00	1.0	43,487.00	$43,487.00
Subtotal					**$2,030,000**			**$1,195,904**
Markup Factor (%)	**10.00%**				**$203,000**			**$119,590**
Total					**$2,233,000**			**$1,315,495**
TOTAL (ROUNDED)					**$2,233,000**			**$1,315,000**
						Net Cost Avoidance*		**$918,000**
Leading to a cost savings (with markup) of approximately $918,000 in project cost dollars.								
		*: Negative number is a cost INCREASE						

VE PROPOSAL CW-2

EVALUATE PROPOSED CONSTRUCTED WETLAND LOCATION FOR POTENTIAL CONSTRAINTS

Alternative Summary	
Total Potential Cost Avoidance:	DESIGN SUGGESTION
Change in Schedule:	Potentially significant

1. **Description of Baseline Concept:** The design documents state that treated flow from the sewage treatment plant will be conveyed and discharged into constructed wetlands. The proposed constructed wetland footprint is approximately 3.5 acres and located along the Peconic River on undeveloped parcels historically used for dredge disposal. Treated effluent will be conveyed to the constructed wetland via a force main.

2. **Description of Design Suggestion:** Consider examining further some of the constraints that may be associated with a constructed wetland in the proposed location including existing wetlands and associated regulated buffers, threatened and endangered species, flood zones, sea level rise projections, potential soil contamination, ongoing maintenance, and phased treated water inputs.

3. **Advantages:**
   - Eliminates the need for a discharge to any waterways
   - Promotes use of undeveloped land for stakeholder and environmental group engagement
   - Provides public access to the waterfront

4. **Disadvantages:**
   - State and federally regulated wetlands are in close proximity to the proposed constructed wetland footprint based on wetland delineation
   - The proposed constructed wetland footprint falls within NYSDEC regulated freshwater and tidal wetland adjacent areas based on wetland delineation
   - Threatened and endangered species have the potential to occur within the constructed wetland footprint based on NYSDEC mapping
   - Portions of the proposed constructed wetland footprint fall within the FEMA 100-year flood zone
   - The proposed constructed wetland footprint falls entirely within NYSDEC's projected 100-year flood zone when accounting for sea level rise
   - The dredge spoils located on the site have the potential to be contaminated
   - The infiltration rates of the soils within the proposed constructed wetland are unknown
   - Constructed wetlands require continual maintenance including herbivory control, invasive species control, and plant mass harvesting
   - The success of plants within a constructed wetland depends largely on flow regime entering the constructed wetland, which would vary over time as the proposed treatment plant is phased

5. **Discussion:** Due to on-site tidal and freshwater wetlands, regulated wetland adjacent areas, mapped threatened and endangered species, the FEMA 100-year flood zone, projected sea level rise, and potential on-site contamination, the proposed constructed wetland presents several regulatory and constructability challenges. The constructed wetland footprint must avoid existing wetland boundaries in order to adhere to federal regulations that would potentially deny the project from occurring. While avoiding existing wetland boundaries, NYSDEC wetland permits would need to be obtained for temporary and permanent impacts to regulated wetland adjacent area. As a part

of this NYSDEC permitting, it would need to be proven that the project will have no impact on potential threatened or endangered species.

As portions of the proposed constructed wetland fall within the FEMA 100-year flood zone, and the entire footprint fall within the NYSDEC projected 100-year flood zone while accounting for sea level rise, there are associated constructability challenges. The constructed wetland would need to be protected from storm events currently and after sea level rise is taken into account. An overall resilient project would need to be designed.

An analysis of historic aerials indicates that the parcels proposed for the constructed wetland have been utilized since at least the mid 1960's, predating many environmental regulations. As such, it is likely that there are contaminated soils within the dredge cell parcels. This would present challenges for the construction, implementation, and permitting of the proposed constructed wetland.

The design documents state that community would be brought on line to the proposed treatment plant in phases, and because of this the flow regime of the constructed wetland would increase over time. As such, the constructed wetland should be designed to dynamically adapt to different flow characteristics. A potential suggestion would be incorporating micro topography within the constructed wetland cell to allow for an initial mosaic of habitats transitioning to one habitat type as water increases within the cell.

6. **Discussion of Schedule Impacts:** Regulatory challenges present scheduling concerns. NYSDEC permitting should be expected to take 6-12 months depending on requirements.

7. **Discussion of Risk Impacts:** Need to address permitting constraints pros and cons for injection gallery versus constructed wetland. Removing the CW will reduce resiliency risk and alleviates potential soil contamination risks.

8. **Discussion of Operating Cost Impacts:** Proper consideration of construction and phasing should reduce maintenance costs over the life of the constructed wetland, but additional considerations, especially resiliency, maintenance, and efficacy of the CW, are required as the design moves further along.

9. **Assumptions driving Cost Calculations:** N/A

VE PROPOSAL CW-2

EVALUATE PROPOSED CONSTRUCTED WETLAND LOCATION FOR POTENTIAL CONSTRAINTS

Baseline Concept Sketches

Figure 1 – Existing Conditions with Wetlands Delineated

Baseline Concept Sketches cont'd

Figure 2 – FEMA Flood Map

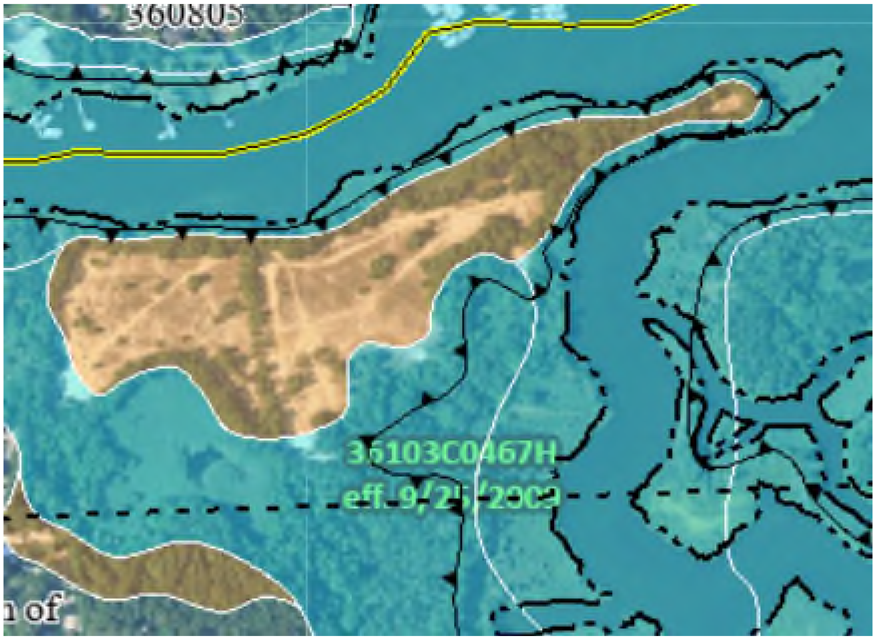
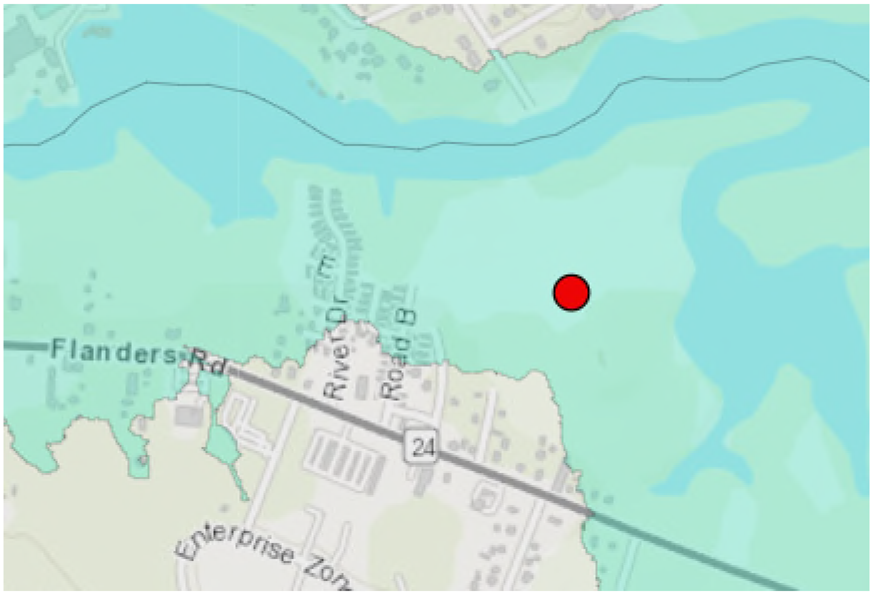


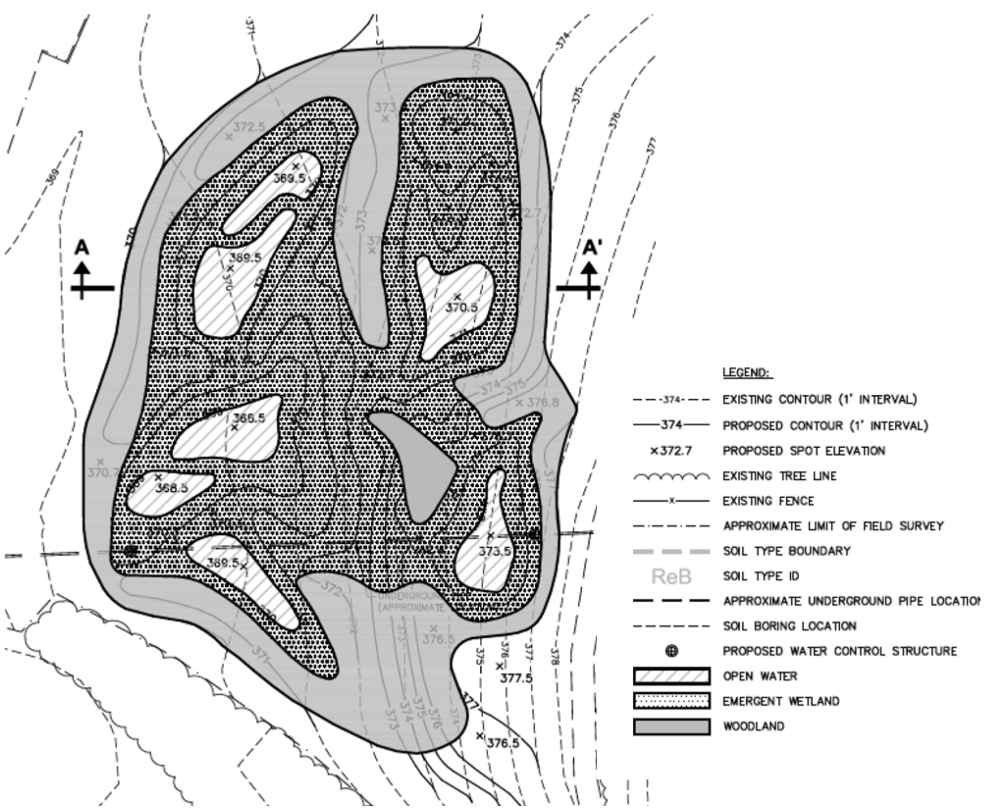
Figure 3 – NYSDEC Sea Level Rise Flood Map



Alternative Proposal Sketches

Figure 4 - 1961 Aerial Imagery

Figure 5 – Example of a Constructed Wetland with Differing Habitat Types



VE PROPOSAL TP-5

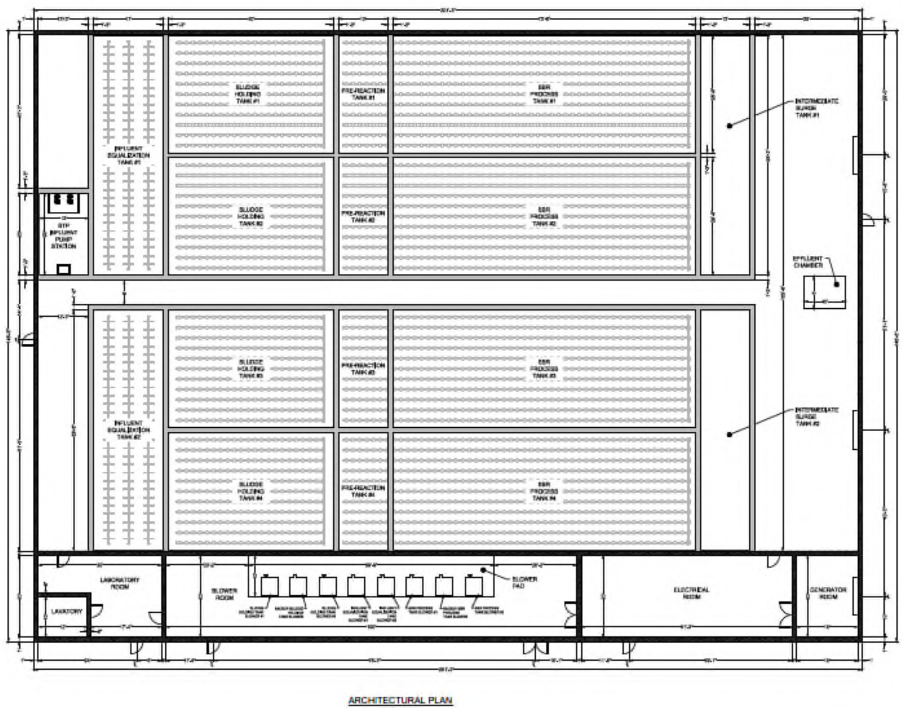
CONFIRMATION OF LIQUID AND SOLIDS TREATMENT/PROCESS ASSUMPTIONS AND CALCULATIONS

Alternative Summary	
Total Potential Cost Avoidance:	DESIGN SUGGESTION
Change in Schedule:	Minor impact – mostly impacts design process

1. **Description of Baseline Concept:** The engineering report (2018) provides some information on liquid and solids treatment and sewer planning that require further vetting if the project moves forward as currently planned – the following are brought up as areas that may require greater investigation and clarification:

    1. <u>SBR System TN removal performance</u>: The future sewage treatment plant (STP) will be permitted for an effluent total nitrogen (TN) concentration of no more than 10 mg/L-N on a year-round basis while providing for year-round nitrification. For the purposes of this VE it is assumed that effluent permit requirements will be in terms of concentration limit on a monthly average basis. The report currently does not outline predicted effluent quality from the SBR system.
    2. <u>Supplemental Alkalinity requirements for nitrification</u>: 2018 report indicates that the future STP may need supplemental alkalinity to ensure that nitrification performance is not inhibited (page 57 of the report). Also design calculations in the 2018 report regarding future chemical storage and feed system designates this as a contingency item to be included after startup of the facility should nitrification performance be inhibited due to pH limitations.
    3. <u>Future STP sludge production</u>: 2018 report provides an estimate of future sludge production at the STP (i.e., Waste Activated Sludge or WAS). The anticipated dry mass at AA conditions is approximately 3,600 lbs/day at a volume of approximately 51,000 gpd and a total solids content of 0.8 %.
    4. <u>Grit Removal considerations</u>: The project currently includes raw influent screening followed by flow equalization and activated sludge/biological treatment in the SBR system.
    5. <u>Mechanical mixing for flow equalization considerations</u>: The project currently includes raw influent screening followed by flow equalization and activated sludge/biological treatment in the SBR system.
    6. <u>Treatment facility layout optimization</u>: 2018 report provides a preliminary architectural plan of the STP building which includes raw influent pumping, influent screening, flow equalization, activated sludge (SBR), aerated sludge storage, and effluent pumping (see image below – Figure 1).

Figure 1 – Treatment Plant Layout



7. Plan for additional Peconic Estuary priority issues: Focus of 2018 report is on economic revitalization through a centralized collection and treatment system and addressing nitrogen point source releases.
8. Establishment of a Sewer District: 2018 report addresses an overview of what the collection and treatment system would look like in the Riverside community.

2. Description of Alternative Concept: This cumulative design suggestion addresses the following future direction and responds to the items noted above regarding the current baseline concept:

1. SBR System TN removal performance: It is recommended that the engineering design team confirm with the SBR manufacturer(s) that the proposed system can achieve an effluent TN concentration below 10 mg/L-N to allow for a safety factor during operations. This should include an understanding of effluent NH_3-N, NO_3-N, and NO_2-N concentrations during summer and winter conditions, at both average annual loading and maximum month loading conditions. It is recommended that either the engineering design team or SBR system manufacturer(s) provide process modeling evaluation results and/or detailed calculations to demonstrate that ability of this system to meet treatment goals without the need for supplemental carbon to aid in denitrification and total nitrogen removal.

Peconic Estuary TMDL: Further confirmation is required that wastewater treatment effluent quality complies with the total maximum daily load (TMDL) for nitrogen discharges to the Peconic Estuary.

2. Supplemental Alkalinity requirements for nitrification: Additional vetting of the design requirements are needed to ensure that he future STP can meet all effluent quality goals upon start-up of the facility with our preliminary evaluation showing a deficit in alkalinity requirements. At a minimum space should be allocated within the building so alkalinity can be added, if needed, in the future.
3. Future STP sludge production: Based upon the data provided in the 2018 report the future facility will have an observed sludge yield of 1.9 pound per day (lbd) Waste Activated Sludge/lbd BOD_5 removed. This is a very high yield for this type of treatment process. Additional data received on 9/16 indicated that sludge production estimates have been revised and are more in line with typical sludge production yields for this type of system. However, the design basis for the SBR system should be revisited to ensure that the future 0.8 MGD influent flow is treated as an average annual flow rate, and not as maximum month flow rate to ensure the system is not under designed for future needs.
4. Grit Removal considerations: Provide for grit removal on raw influent downstream of influent screening or consider how grit will be removed from equalization tank (e.g., baffle wall to protect pumps and removal by vacuum truck).
5. Mechanical mixing for flow equalization considerations: Consider mechanical mixing of flow equalization to reduce energy consumption and limit carryover of dissolved oxygen to anoxic phase of SBR process. This should be weighed against odor generation concerns when being compared to diffused aeration for mixing.
6. Treatment facility layout optimization: Consider revisions to the treatment layout to include the following **potential** items:
    a. Phasing of construction/treatment tied to collection system connections to the STP
    b. Chemical storage and feed systems including supplemental carbon and supplemental alkalinity
    c. Inclusion of odor control (exterior biofilter) to reduce odors and humidity within the building
    d. Sludge thickening via gravity belt thickening (GBT)
7. Plan for additional Peconic Estuary priority issues: Target and plan for other potential limits as spelled out in the Peconic Estuary Program such as submerged aquatic vegetation and pathogens – see below:

What are a few of the Peconic Estuary Program's achievements and initiatives?

- Adoption of a nitrogen guideline and a point source nitrogen freeze for the western estuary
- Adoption of a water quality preservation policy for the eastern estuary
- Development of a preliminary submerged aquatic vegetation and management strategy, including a long-term monitoring, restoration trials to develop survival criteria, and integration with water quality monitoring and modeling
- Development of a Pathogens Total Maximum Daily Load (TMDL) for 21 water bodies listed as impaired on New York State's 303(d) list
- Development of a Nitrogen TMDL for selected water bodies in the western estuary
- Creation of the PEP Critical Lands Protection Plan, prioritizing the preservation of lands available for development
- Preparation of an Environmental Indicators Report detailing the relative health and stresses on the water body. The report focused on key parameters including Brown Tide, nutrients, habitat and living resources, pathogens, toxic substances and land management issues, and concluded that the estuary is in overall good condition although significantly impacted in the more densely developed western bays and tributaries.
- Support for a PEP State of the Bays Science Conference that was held in April 2005 and featured presentations by 18 scientists
- Implementation of subwatershed management plans for Reeves Bay, Hashamomuck Pond, West Neck Bay and Meetinghouse Creek. Contracts for six additional watershed management plans have been completed for Town and Jockey Creeks, Goose Creek, Richmond Creek, Acabonac Harbor, Sebonac Creek Complex and Dering Harbor.
- Developed GIS layers of land cover, impervious surfaces, eelgrass beds, hardened shoreline and protected lands.
- Supported a large scale 2.7 million dollar scallop restoration project conducted by Cornell Cooperative Extension and Long island University, to jump start Peconic Bay scallop populations
- State-of-the-art technical characterizations and management tools, including sediment nutrient flux and surface water modeling studies
- Implementation of an early detection rapid response monitoring and volunteer eradication program for *Ludwigia peploides* (water primrose) from the freshwater Peconic River
- Installation of a rock ramp fish ladder on the Peconic River at Grangebel Park in Riverhead, to facilitate alewives access to the freshwater portion of the river
- Participation in the Suffolk County Shellfish Aquaculture Lease Program for Peconic Bay and Gardiners Bay
- Secured funding for research into the causes and effects of harmful algal blooms in the estuary caused by the organism *Cochlodinium polykrikoides*
- To increase public education and outreach, a website has been created (link below), and an electronic newsletter, "Peconic Press", that provides updates on current topics affecting the estuary, is issued quarterly.

8. Establishment of a Sewer District: Develop a map, plan and report to be filed in the office of the town clerk to begin the development of a new sewer district that will trigger, among other things, a sewer rate study. The legal requirements for this can be found here:

   https://codes.findlaw.com/ny/town-law/twn-sect-209-c.html

3. Advantages:

- Ensures SBR system can consistently achieve the required nitrogen removal as is without additional process or chemical modifications
- Expected that SBR treatment system size and cost may decrease
- Ensures that the SBR system solids handling system tankage and equipment are properly sized
- Grit removal impacts
  - Reduces inert suspended solids (SS) accumulation in flow equalization/SBR system with potential reduction in maintenance for removal
  - Reduces inert SS loading to SBR system which may increase capacity
  - Increases pumping system life due to decrease in wear and tear
- Mechanical mixing impacts
  - Reduces dissolved oxygen (DO) concentrations entering the SBR system
  - Reduces odor control system requirements
- Provides an optimized treatment facility layout
- Addresses other nutrient and pathogen concerns besides nitrogen

- Establishes the required approach for development of a sewer improvement district

4. **Disadvantages:**
   - Additional vetting of effluent targets between the project design team (PDT), the SBR manufacturer, and the Town of Southampton (TOS)
   - TMDL restrictions may require more stringent nitrogen limits
   - Grit removal impacts
     - Increases capital costs of project
     - Increases operations and maintenance requirements
     - Increases truck traffic and hauling costs
   - Additional items like supplemental carbon, alkalinity, GBT, and odor control will increase initial capital costs of the project
   - Sewer district development and incorporation of additional solids/liquids treatment requirements may extend the design timeline of this project

5. **Discussion:** The following discussion addresses each of the eight components brought up regarding treatment systems vetting required:

   1. SBR System TN removal performance: The engineering report provided does not include a summary of anticipated effluent quality from the SBR system. Given the high concentrations of raw influent TKN and NH3-N, the need to achieve an effluent TN concentration comfortably below 10 mg/L-N, and a relatively low influent BOD5/N ratio (~4-6 based on TKN or NH3-N), it is important to understand if this system can achieve treatment goals without the benefit of a supplemental carbon source to enhance denitrification and therefore TN removal.
   2. Supplemental Alkalinity requirements for nitrification: Based upon the provided influent concentrations for TKN, NH_3-N, and alkalinity, and an estimate of effluent NO3-N concentrations to meet TN removal goals, it is anticipated that supplemental alkalinity will be required to achieve full year-round nitrification. **Table 1** below summarizes the preliminary calculations from the VE Team for a wastewater treatment alkalinity balance at future average conditions only.

Table 1 – Example Alkalinity Balance at AA Conditions

Parameter	Value (AA Conditions)
Raw Influent	
Influent Flow, MGD	0.8
Influent TKN, mg/L	65
Influent NH_3-N, mg/L	43
Influent Alkalinity, mg/L	150
Anticipated STP Effluent Quality[3]	
Effluent NH_3-N, mg/L	0.5
Effluent NO_3-N, mg/L	5
Effluent NO_2-N, mg/L	0.5
Effluent Org N, mg/L	1.5
Effluent TN, mg/L	7.5
Effluent Alkalinity Target, mg/L	25
Preliminary Alkalinity Balance	
Alkalinity Required for Nitrification, lbd[2]	2,050
Alkalinity Recovered from Denitrification, lbd	874
Influent Alkalinity, lbd	1,001
Effluent Alkalinity, lbd	(175)
Effluent Alkalinity, mg/L	(26)

[1]Alkalinity in terms of $CaCO_3$
[2]Nitrification requirement based on influent NH3-N only. Design team/SBR manufacturer(s) to confirm portion of org-N that contributes to nitrification based on process modeling/calculations.
[3]Effluent quality assumptions based on full-nitrification and achieving a TN concentration target below 10 mg/L-N. Design team/SBR manufacturer(s) to confirm achievable effluent quality.

3. Future STP sludge production: Based upon the provided information, the sludge production estimate is much higher than typically seen, even for treatment facilities operating without primary clarification. Expected values would be no more than 1.1 lbd WAS/lb BOD_5 Removed and will depend on activated sludge SRT targets and influent characteristics. Updated calculations provided on 9/16 are closer to this 1.1 value.
4. Grit Removal considerations: This proposal would include grit removal on the raw influent stream to the Riverside STP. The unit process could be located downstream of influent screening and upstream of flow equalization. This additional unit process may help reduce inert suspended solids loading, minimizing accumulation in the equalization tank and reducing loading on the SBR system.
5. Mechanical mixing for flow equalization considerations: This alternative would include replacement of diffused aeration with mechanical mixing in the flow equalization basins. This approach will reduce any odor control requirements within the STP building and will reduce DO concentrations entering the SBR system, which may benefit denitrification performance.
6. Treatment facility layout optimization: The 2018 report provided does not include certain items identified above. The treatment facility layout should be revised to allocate space for these items should they become necessary.
7. Plan for additional Peconic Estuary priority issues: Per the Peconic Estuary Program website, nitrogen is not the only effluent targets that TOS needs to address as this design project progresses with additional concerns like submerged aquatic vegetation and additional pathogens as noted in the State of New York’s 303(d) list.

8. Establishment of a Sewer District: The Riverside community is going from a decentralized treatment (septic and leach field) and is moving to a centralized collection and treatment system with some options (see other alternative proposals) that may look to work with Riverhead regarding solids treatment or both solids and liquid treatment. Establishing a sewer district is a key element that TOS will need to address as this project progresses.

6. Discussion of Schedule Impacts: There should be no significant impacts to project schedule with the following caveats:

- If supplemental carbon and alkalinity are required, storage and feed systems will need to be included as the design process continues
- Revisions to sludge production estimates will likely impact WAS pump systems, sludge storage requirements, and associated equipment sizing

7. Discussion of Risk Impacts: This item presents a minimal risk to the project. However:

1. The need for supplemental carbon will potentially impact SBR tank sizing, MLSS concentrations, and equipment sizing
2. Changes in sludge volumes may impact reactor volumes and equipment sizing

8. Discussion of Operating Cost Impacts: The types and magnitude of impacts on operating costs will not be known until final determination is made on each of the items identified above. Reducing the size of the SBR system may reduce aeration and pumping electricity consumption. Additional items like supplemental carbon, alkalinity, sludge thickening (via GBT), and odor control will increase operating costs. Sludge thickening will reduce hauling and management costs. Inclusion of mixing or aeration in equalization tank will increase electricity use but may reduce maintenance costs and odor impacts.

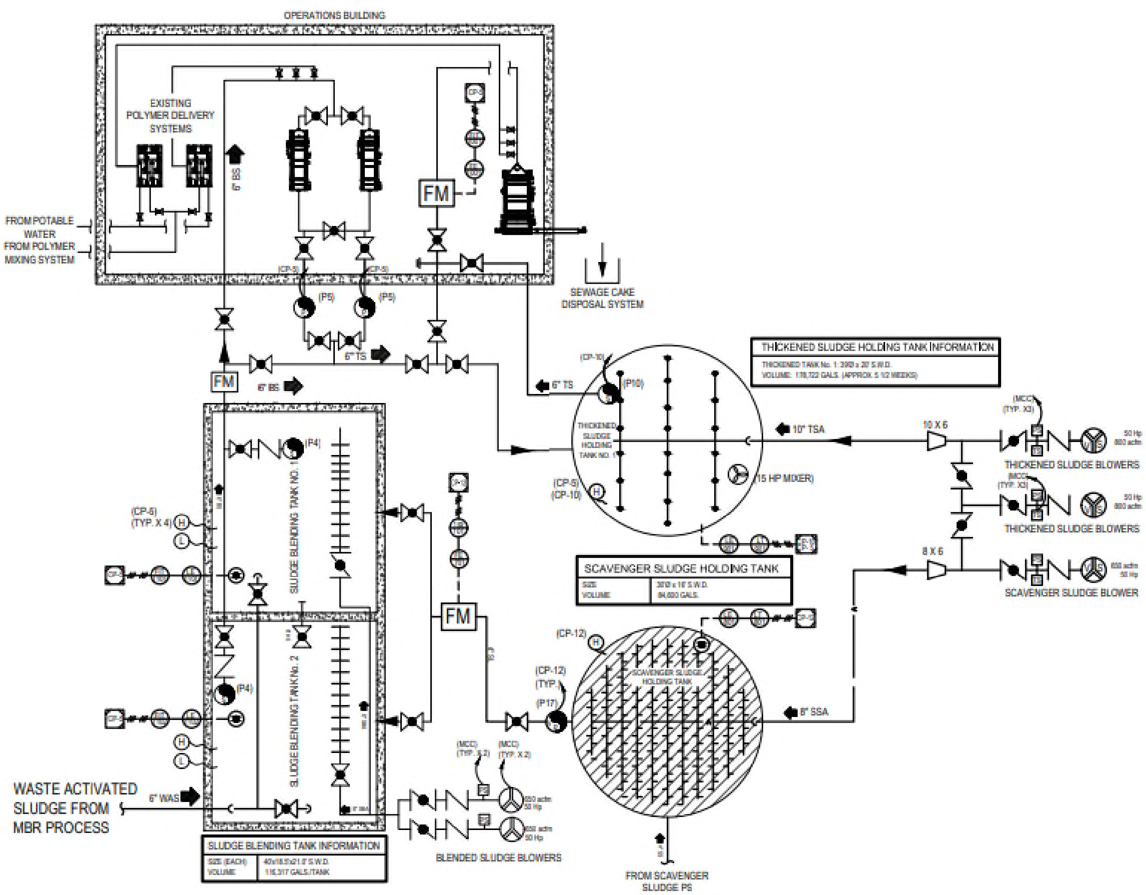
9. Assumptions driving Cost Calculations: N/A

VE PROPOSAL TP-7

EXPAND AND CONFIRM BIOSOLIDS MANAGEMENT AT RIVERHEAD WRRF

Alternative Summary	
Total Potential Cost Avoidance:	DESIGN SUGGESTION
Change in Schedule:	Significant potential impact possible

1. **Description of Baseline Concept:** Based upon discussions with the engineering team and the Town, sludge produced at the new Riverside STP will be hauled to the nearby Riverhead WRRF and introduced at a) either the headworks of the liquid treatment train or b) the dedicated scavenger waste treatment system for further processing. It has been confirmed that the latter is proposed and below is the existing sludge treatment flow diagram at Riverhead.



Existing Conditions Sludge Treatment Process Flow Diagram

SCALE: NTS

2. **Description of Alternative Concept:** It is recommended that the Town and the engineering design team review and vet sludge production estimates and confirm with the Riverhead WRRF that this solids loading can be accommodated at their facility. In addition, the Town and the engineering design team should ascertain if a thermal sludge dryer will be added to the solids treatment process at the Riverhead WRRF, which may allow for synergy between the two facilities in terms of

biosolids management and disposal. Also review Proposal TP-8 which looks to add a gravity belt thickener to reduce volume transferred to Riverhead.

3. **Advantages:**
   - Ensures that biosolids produced at the Riverside STP have an ultimate place for treatment and disposal and that Riverhead is fully engaged in handling expected flow and solids percentage

4. **Disadvantages:**
   - Will require additional communication and discussion between the engineering design team, the Town, and the Riverhead facility
   - Requires intermunicipal agreement between Riverside and Riverhead

5. **Discussion:** The Riverside STP will be rated to treat to 0.8 MGD, which is roughly 50% of the permitted capacity of the Riverhead WRRF. The WAS loading from the Riverside STP will represent a significant portion of the overall influent loading at the Riverhead WRRF. An evaluation should be performed to determine if the scavenger waste treatment system can handle this loading.

   It may also be possible to direct the sludge to the solids handling treatment train and process it through the existing GBT and BFP at the Riverhead WRRF if there is excess capacity available. There is the also the potential for synergy between the two treatment facilities through the expansion of solids handling at Riverhead and the incorporation of a thermal sludge dryer at the Riverhead facility. It is the VE team's understanding that this technology has been evaluated and the plant will potentially be upgraded to include this unit process to generate a Class A biosolid and reduce long-term disposal costs (currently treated solids are hauled to Pennsylvania). Is it possible to enter into an agreement with the Riverhead WRRF and to include the future Riverside STP sludge in the design basis for this upgrade?

6. **Discussion of Schedule Impacts:** There is the potential for significant schedule impacts should it be determined that the Riverhead WRRF cannot accommodate a portion or all of the anticipated Riverside STP sludge production.

7. **Discussion of Risk Impacts:** This item presents a significant risk to the project, as disposal of biosolids is becoming more costly throughout the country. The engineering design team and the Town should consider alternative options for ultimate disposal prior to moving forward with this project.

8. **Discussion of Operating Cost Impacts:** Accurate determination of the amount of biosolids production and the manner in which biosolids will be thickened, transported, and managed will have a significant impact on operating costs. It will be important to thoroughly evaluate these items as part of the more detailed analysis.

9. **Assumptions driving Cost Calculations:** N/A

VE PROPOSAL TP-8

INCORPORATE A GRAVITY BELT THICKENER AT THE PLANT TO REDUCE SLUDGE VOLUME AND SUBSEQUENT SLUDGE MANAGEMENT COSTS ASSESSED BY RIVERHEAD

Alternative Summary	
Total Potential Cost Avoidance:	($330,000) initial CAPEX cost, potential annual savings costs vary from $500K to $1.8M depending on sludge processing and disposal assumptions
Change in Schedule:	Minor increase to schedule

1. **Description of Baseline Concept:** The engineering report indicates that solids will be separated, collected and routed to Riverhead Treatment Plant for processing (see also Pro, Nos. TP-5 and TP-7).

2. **Description of Alternative Concept:** Proposal addresses the addition of a 1.0M gravity belt thickener to increase the solids percentage in the sludge from 0.5% to 5.0% reducing the haul volume sent to Riverhead.

3. **Advantages:**
   - Reduces solids to be handled and transported
   - Reduces carbon footprint associated with hauling sludge
   - Provides more flexibility for future handling of solids/sludge
   - Reduces operations and maintenance costs
   - Reduces scavenger fee charged at Riverhead plant and avoids overwhelming the loadings at the Riverhead plant

4. **Disadvantages:**
   - Increases initial capital costs of the project
   - Requires room in building or an enclosed solids treatment area for processing solids

5. **Discussion:** Incorporation of a gravity belt thickener will significantly reduce the volume of sludge produced and transported as solids percentage is increased from 0.5% to 5.0% leading to nearly a 90% reduction in volume of what is transported to the Riverhead plant. The GBT will increase initial capital costs but will lower sludge disposal costs, lower energy and polymer usage, lower labor cost and transportation costs, and provide for reliable solids operations at the Riverside facility.

6. **Discussion of Schedule Impacts:** Slight increase in schedule but not an impact to the critical path schedule of this project.

7. **Discussion of Risk Impacts:** Risks are alleviated by reducing travel impacts to the area around the Riverside plant.

8. **Discussion of Operating Cost Impacts:** Inclusion of a GBT will result in increased electricity consumption, chemical consumption (if needed), and labor costs. However, it will significantly reduce the operating costs associated with hauling and disposal of biosolids. The overall net impact will be a reduction in long-term operating costs.

VE PROPOSAL TP-8

INCORPORATE A GRAVITY BELT THICKENER AT THE PLANT TO REDUCE SLUDGE VOLUME AND SUBSEQUENT SLUDGE MANAGEMENT COSTS ASSESSED BY RIVERHEAD

9. Assumptions driving Cost Calculations:

- Quote for 1.0M GBT is approximately $180,000
- Additional costs associated with pumps, ancillary equipment and installation
- Reduction in solids produced using the GBT would reduce hauling, scavenger treatment costs, and disposal cost by a minimum of 80% (looking at a downturn of 10 to 1 in the volume of material to be hauled off
- ***LCC analysis which is based on many variables depends on solids treatment process, final disposal location, and costs of processing and disposal. Payback period for the GBT will be within a year based on trucking and sludge disposal costs avoided***

Cost Evaluation (CAPEX)

Construction Item (Contract Costs)			Original Estimate			Alternative Estimate		
Project Item		Units	Qty	Unit $	Total	Qty	Unit $	Total
1.0 M Gravity Belt Thickener		LS			$0.00	1.0	300,000.00	$300,000.00
incl ancillary items and installation					$0.00			$0.00
					$0.00			$0.00
Subtotal					**$0**			**$300,000**
Markup Factor (%)	**10.00%**				**$0**			**$30,000**
Total					**$0**			**$330,000**
TOTAL (ROUNDED)					**$0**			**$330,000**
							Net Cost Avoidance*	**($330,000)**

*: Negative number is a cost INCREASE

VE PROPOSAL TP-8

INCORPORATE A GRAVITY BELT THICKENER AT THE PLANT TO REDUCE SLUDGE VOLUME AND SUBSEQUENT SLUDGE MANAGEMENT COSTS ASSESSED BY RIVERHEAD

Cost Evaluation (OPEX) – shows disposal impacts with solids handling at Riverhead (on a volume basis) or to landfill (on a wet ton basis) – both evaluations include transportation costs by a 3rd party to bring material from the Riverside STP to the Riverhead WRRF for processing.

Parameter	Raw Sludge		Thickened Sludge	
	Annual Average	Maximum Month	Annual Average	Maximum Month
WAS Load, lbd	1,537	2,306	1,537	2,306
WAS TSS, mg/L	4,493	4,493	4,493	4,493
WAS Volume, gal/d	41,018	61,527	41,018	61,527
GBT Solids Capture, %	No Sludge Thickening		0.95	0.95
Thickened Sludge, lbd			1,460	2,190
Thickened Sludge, % TS			5	5
Thickened Sludge Volume, gal/d			3,502	5,252
Rivhearhead Disposal at Scavenger Waste - Fee Based on Volume Delivered				
Riverhead WRRF Disposal Fee, $/gal	$0.09			
Riverhead WRRF Fee, $/day	$3,692	$5,537	$315	$473
Riverhead WRRF Fee, $/year	$1,403,575		$119,819	
Trucking Costs to Riverhead WRRF by Third Party				
Truck Capacity, gallons	5,000		5,000	
Distance Between Facilities Roundtrip, miles	4		4	
Roundtrip Duration, hrs	2		2	
Labor, $/hr	$50		$50	
Truck Debt, $/hr	$20		$20	
Maintenance/Gas/Overhead, $/mile	$1		$1	
Profit, %	20%		20%	
Trips per Day	9		1	
Miles Per Day	36		4	
Duration, hrs	18		2	
Total Cost, $/day	$1,555		$173	
Total Cost, $/year	$567,648		$63,072	
Savings with GBT Operation, $/year	**$1,788,332**			
Riverhead Disposal at Scavenger Waste - Fee Based on Wet Ton Contribution				
Riverhead WRRF Disposal Fee, $/Wet Ton	$133			
Riverside STP Sludge Load, lbd	1,537	2,306	1,460	2,190
Riverside STP Sludge Load, DT/d	0.77	1.15	0.73	1.10
Scavenger Waste BFP Cake, % TS	17			
Riverside STP Sludge Load, WT/d	5	7	4	6
Riverside STP Sludge Load, WT/yr	1,719		1,633	
Riverhead WRRF Fee, $/year	$228,720		$217,284	
Trucking Costs to Riverhead WRRF by Third Party				
Truck Capacity, gallons	5,000		5,000	
Distance Between Facilities Roundtrip, miles	4		4	
Roundtrip Duration, hrs	2		2	
Labor, $/hr	$50		$50	
Truck Debt, $/hr	$20		$20	
Maintenance/Gas/Overhead, $/mile	$1		$1	
Profit, %	20%		20%	
Trips per Day	9		1	
Miles Per Day	36		4	
Duration, hrs	18		2	
Total Truck Cost, $/day	$1,555		$173	
Total Truck Cost, $/year	$567,648		$63,072	
Savings with GBT Operation, $/year	**$516,012**			

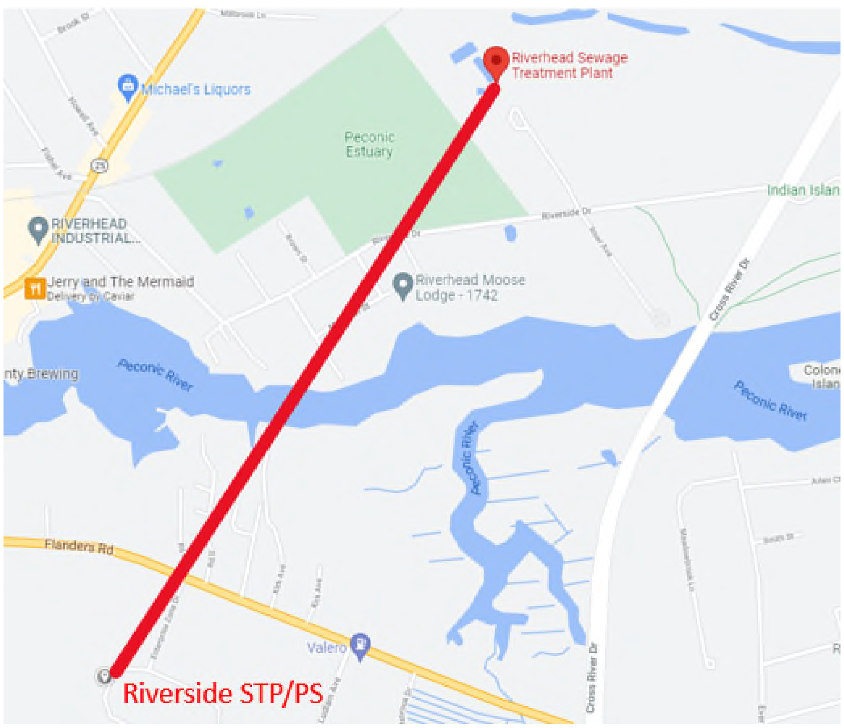
VE PROPOSAL - TP-10

EXPANSION OF RIVERHEAD WRRF AND RIVERSIDE FLOW DIVERSION

Alternative Summary	
Total Potential Cost Avoidance:	$1,370,000
Change in Schedule:	Significant planning impacts

1. **Description of Baseline Concept:** The project currently includes wastewater collection/conveyance and a new centralized STP sized to treat up to 0.8 MGD, and a constructed wetland for discharge of treated wastewater within the hamlet of Riverside.

2. **Description of Alternative Concept:** Provide for treatment capacity expansion at the Riverhead WRRF, bringing the permitted capacity from 1.5 MGD up to approximately 2.3 MGD. Collect and convey the wastewater from Riverside to a new transfer pump station to direct the flow via force main to the Riverhead WRRF. Image below shows proximity of potential Riverside STP or Transfer PS to the Riverhead WRRF (approximately less than 1.0 miles between the two facilities).



3. **Advantages:**
   - Eliminates the need for staffing and maintenance at the Riverside STP. Potential for reducing staff by two FTE
   - Still allows for economic revitalization/growth in Riverside community
   - Eliminates the need for a constructed wetland or alternative discharge method as part of Riverside STP discharge and allows the area to be developed exclusively as waterfront recreation as needed
   - Reduces truck traffic in Riverside community and eliminates sludge hauling costs
   - Can still use STP site as the location for the transfer pump station

4. **Disadvantages:**
    - Requires discussions and planning effort with Riverhead to determine feasibility addressing the following:
        - o Riverhead WRRF site constraints may prevent treatment expansion
        - o Additional nutrient loading to Peconic River and potential permitting difficulty
        - o Water quality modeling requirements
    - Potential for one FTE additional staffing at Riverhead WRRF
    - Sludge disposal costs for Riverhead replaced with fee to accept wastewater for treatment
    - Long-term O&M costs and economic impacts transferred to Riverhead WRRF
    - Riverhead would need to include Riverside on their Sewer Board

5. **Discussion:** This alternative would include wastewater collection and conveyance to a central flow transfer pump station located within the Riverside community which would then direct the flow via force main to the Riverhead WRRF (either under the Peconic River or traverse under the Cross River Drive bridge). The Riverhead WRRF would require an upgrade/expansion and permit modification to accept the additional wastewater flow. This approach may provide the Town of Southampton with numerous benefits as detailed above but would link economic growth with decisions made by additional stakeholders.

6. **Discussion of Schedule Impacts:** As this alternative would require a feasibility evaluation there is a significant impact to the overall schedule.

7. **Discussion of Risk Impacts:** This item presents a significant risk to the project in terms of schedule and transfer risks to Riverhead while also conveying all sewer control to Riverhead.

8. **Discussion of Operating Cost Impacts:** The overall impact on operating costs will not be known until the feasibility evaluation is completed. In general, it is expected that operating costs may be reduced because of an incremental increase in operating costs at Riverhead versus entirely new costs associated with ownership and operation of a STP by Riverside. For example, one additional operator may be required at Riverhead, versus the need for two at Riverside.

9. **Assumptions driving Cost Calculations:**
    - Costs provided in 2018 CWSRF Engineering Report used as basis for cost development
    - Costs escalated to 2021 based on 8.9% inflation rate
    - Collection system work in Riverside community to remain in project with new transfer pump station and force main below Peconic River to Riverhead WRRF
    - Cost of expansion of Riverhead WRRF based on provided cost for SBR system at Riverside STP. Cost of standby electrical generation, STP building, and constructed wetlands removed with expansion of treatment at the Riverhead WRRF
    - Savings are conservative with more potential savings expected with transferring treatment to an established plant

VE PROPOSAL - TP-10

EXPANSION OF RIVERHEAD WRRF AND RIVERSIDE FLOW DIVERSION

Cost Evaluation

Construction Item (Contract Costs)			Original Estimate			Alternative Estimate		
Project Item		**Units**	**Qty**	**Unit $**	**Total**	**Qty**	**Unit $**	**Total**
Standby Generator		LS	1.0	816,750.00	$816,750.00			$0.00
STP Building		LS	1.0	1,579,050.00	$1,579,050.00			$0.00
Constructed Wetlands		LS	1.0	1,252,350.00	$1,252,350.00			$0.00
STP Land Acquisition		LS	1.0	1,149,984.00	$1,149,984.00			$0.00
Transfer Pump Station		LS			$0.00	1.0	1,375,000.00	$1,375,000.00
Transfer Force main (5,000 LF)		LS			$0.00	1.0	2,178,000.00	$2,178,000.00
					$0.00			$0.00
Subtotal					**$4,798,134**			**$3,553,000**
Markup Factor (%)	**10.00%**				**$479,813**			**$355,300**
Total					**$5,277,947**			**$3,908,300**
TOTAL (ROUNDED)					**$5,278,000**			**$3,908,000**
							Net Cost Avoidance*	**$1,370,000**

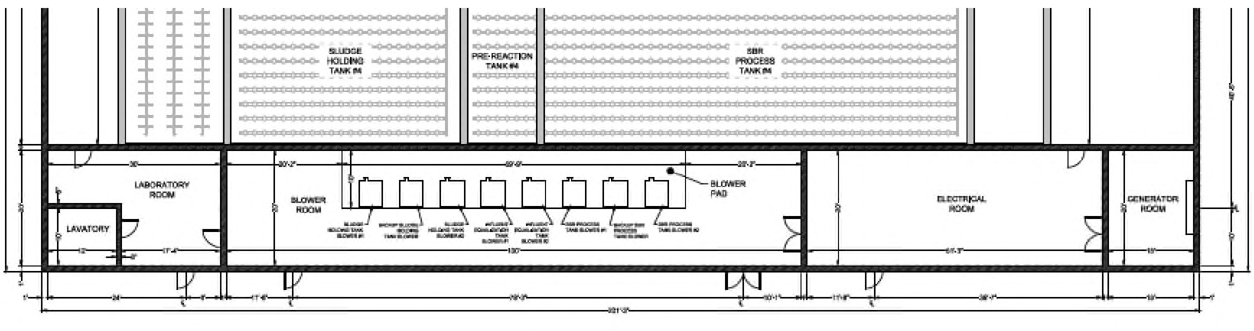
*: Negative number is a cost INCREASE

VE PROPOSAL TP-11

REMOVE GENERATOR ROOM FROM NEW TREATMENT PLANT BUILDING AND PLACE OUTSIDE OF THE BUILDING AND REPURPOSE SPACE

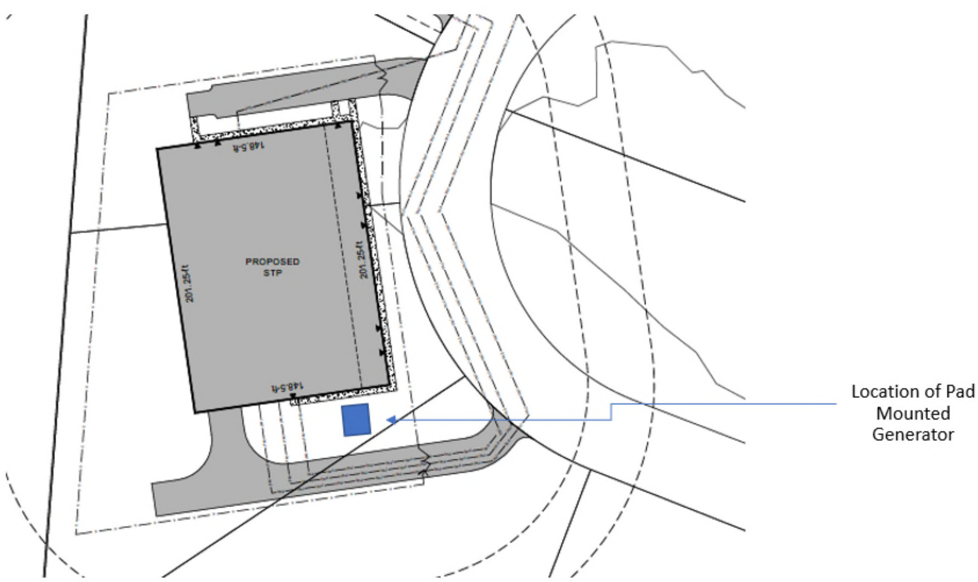
Alternative Summary	
Total Potential Cost Avoidance:	DESIGN SUGGESTION
Change in Schedule:	No impact

1. **Description of Baseline Concept:** The engineering report indicates that the southern extents of the treatment building incorporates a lavatory, a laboratory, a blower room, an electrical room, and a generator room as shown below:



ARCHITECTURAL PLAN

2. **Description of Alternative Concept:** Proposal targets a modification to the non-process space that relocates the generator outside of the building and utilizes that space in the building to either expand the laboratory room or the electrical room. Proposed location of generator is moved to the south side of the plant which would require swapping the location of the electrical room and the laboratory and lavatory.



VE PROPOSAL TP-11

REMOVE GENERATOR ROOM FROM NEW TREATMENT PLANT BUILDING AND PLACE OUTSIDE OF THE BUILDING AND REPURPOSE SPACE

3. **Advantages:**
   - No incidental impact to indoor air quality, exhaust issues or facility operations
   - Generator is protected within the fenced boundary

4. **Disadvantages:**
   - Prone to weather impacts
   - Sound attenuation may be required

5. **Discussion:** Putting the generator outside may reduce the footprint of the treatment building and will minimize potential impacts to plant operations and air quality concerns within the building. Also this frees up space within the plant building footprint for solids handling/GBT, odor control, and chemical storage and feed systems.

6. **Discussion of Schedule Impacts:** Negligible impact to design and construction schedule.

7. **Discussion of Risk Impacts:** Placement outside reduces incidental exhaust releases in the building but can also lead to vandalism concerns.

8. **Discussion of Operating Cost Impacts:** No impact to operating costs is expected. The generator will be constructed in an enclosure and adequately protected from the elements. If the building size is able to be reduced or, if the space is able to be used for an additional purpose that would otherwise increase the building size, then relocation of the generator will provide a modest avoided cost increase associated with conditioning additional interior space.

9. **Assumptions driving Cost Calculations:** N/A

VE PROPOSAL CS-1

RELOCATE PUMPING STATIONS TO LOWER-LYING AREAS TO REDUCE EXCAVATION DEPTH

Alternative Summary	
Total Potential Cost Avoidance:	$303,000
Change in Schedule:	None

1. **Description of Baseline Concept:** The conceptual design documents show four pumping stations within the proposed collection system. However, as shown the collection system sewers and pumping stations would need to be quite deep, and there are several low-lying areas that would not be able to be served by gravity collection for conveyance. Residences and businesses in these low-lying areas would need to pump their service connection to the sewer district.

Figure 1 - Proposed Pumping Station Locations (in Orange)

2. **Description of Alternative Concept:** Relocating two of the pumping stations to lower-lying locations would enable more of the sewer district to be served by gravity collection and conveyance to a proposed pumping station, thereby minimizing the number of residences and business that would need a pumped wastewater connection.

3. **Advantages:**
   - Improves functionality
   - Reduces pumping station depth

VE PROPOSAL CS-1

RELOCATE PUMPING STATIONS TO LOWER-LYING AREAS TO REDUCE EXCAVATION DEPTH

- Reduces collection system piping depth
- Minimizes pumped service connections and associated homeowner/business owner connection cost

4. **Disadvantages:**
    - Height above existing grade for pumping stations in low-lying areas may need to be increased for resiliency due to potential flooding
    - Two additional pump station locations are near or within the FEMA 100-Year flood zone (to be further evaluated by design engineer)

5. **Discussion:** Relocating pumping stations would benefit the sewer district by reducing collection system and pumping station depth, as well as minimizing the number of residences and business that would need a pumped wastewater connection.

6. **Discussion of Schedule Impacts:** This proposed alternative would not impact schedule.

7. **Discussion of Risk Impacts:** Risk of flooding pumping stations can be mitigated by raising their height above existing grade.

8. **Discussion of Operating Cost Impacts:** Because a larger volume of flow will be pumped from a somewhat lower elevation, there will be an increase in long-term electricity usage across the collection system. However, because other pump stations will be able to be constructed at a shallower depth and will convey a smaller percentage of flow, the increase is expected to be less than 5% of the collection system-wide electricity use and may be partially offset through proper design.

9. **Assumptions driving Cost Calculations:**
    - It is assumed that the cost implications for relocating two of the proposed pumping stations would result in a net savings due to reduced collection and pumping station depths. The savings would be partially offset by approximately 500 LF of additional force main length.

Cost Evaluation

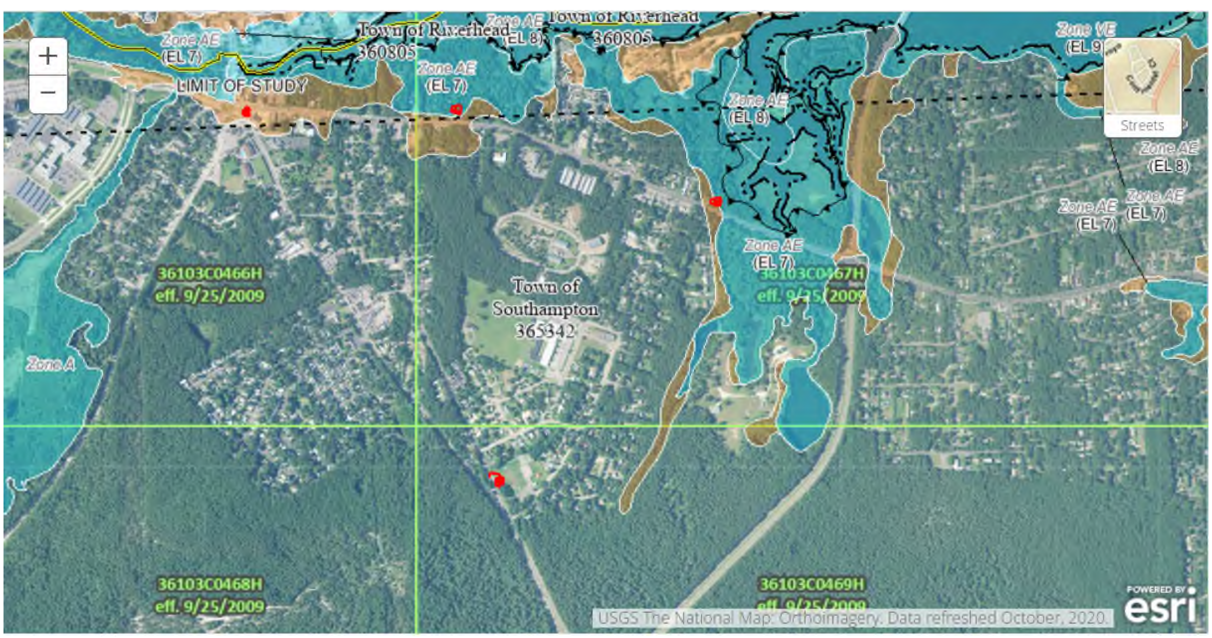
Construction Item (Contract Costs)			Original Estimate			Alternative Estimate		
Project Item		**Units**	**Qty**	**Unit $**	**Total**	**Qty**	**Unit $**	**Total**
Force Main		LF	10810.0	170.00	$1,837,700.00	11310.0	170.00	$1,922,700.00
Pump Stations		EA	4.0	425,000.00	$1,700,000.00	4.0	400,000.00	$1,600,000.00
Collection System Reduced Depth		LS	1.0	5,211,400.00	$5,211,400.00	1.0	4,950,830.00	$4,950,830.00
					$0.00			$0.00
Subtotal					**$8,749,100**			**$8,473,530**
Markup Factor (%)	**10.00%**				**$874,910**			**$847,353**
Total					**$9,624,010**			**$9,320,883**
TOTAL (ROUNDED)					**$9,624,000**			**$9,321,000**
							Net Cost Avoidance*	**$303,000**

*: Negative number is a cost INCREASE

Alternative Sketch:

Figure 2 - Alternative Pumping Station Locations (in Orange)

Figure 3 - FEMA 100-Year Flood Zone Map



The three proposed northern pump stations are within or close to the 100-year flood zone.

VE PROPOSAL CS-2

PROVIDE GRAVITY SEWER NEAR STP IN LIEU OF FORCE MAINS TO INFLUENT STP PUMP STATION

Alternative Summary	
Total Potential Cost Avoidance:	DESIGN SUGGESTION
Change in Schedule:	No impact

1. **Description of Baseline Concept:** The conceptual design documents show two force mains running in parallel as they approach the STP from the West, and another force main approaching the STP from the North. All three force mains wrap around the East side of the STP before entering the influent lift station on the south side of the STP

2. **Description of Alternative Concept:** Combining the parallel force mains into one pipe would result in a small cost savings and simplify future maintenance should one of the force mains need to be repaired or replaced. Additionally, the force mains could end in a gravity collection system in the Enterprise Zone Drive loop, thereby shortening the force main length.

3. **Advantages:**
   - Simplifies phasing if one of the force mains is needed before the other to accommodate build out
   - Reduces force main length
   - Simplifies future maintenance

4. **Disadvantages:**
   - Potential for odors (hydrogen sulfide) where the force mains discharge into gravity collection system manholes
   - Somewhat less resilient because more flow could be conveyed through a single force main. However, a single line may be more easily monitored and maintained, improving longevity and reducing risk of failure

5. **Discussion:** The potential reduction in force main piping would meet the conveyance system needs with fewer pipes, while also simplifying phasing (design engineer later noted that combining force main piping may not allowable/feasible in Suffolk County – which requires further confirmation). Minimizing the number of pipes entering the treatment facility eliminates buried piping congestion and the remaining buried pipe would be more accessible should it need to be repaired or replaced in the future. Allowing gravity flow before the STP would slightly minimize project costs and construction concerns.

6. **Discussion of Schedule Impacts:** Force main and gravity collection pipe is not expected to be on the critical path and therefore this proposed alternative would not impact schedule.

7. **Discussion of Risk Impacts:** Potential for odors would be localized and near the treatment plant.

8. **Discussion of Operating Cost Impacts:** Energy cost impacts would be expected to be negligible. Maintenance costs associated with a single force main would be expected to be slightly less than with two force mains, but may be offset by maintenance associated with the connection and/or potential odors. Overall, minimal expected impact on life-cycle costs.

VE PROPOSAL CS-2

PROVIDE GRAVITY SEWER NEAR STP IN LIEU OF FORCE MAINS TO INFLUENT STP PUMP STATION

9. Assumptions driving Cost Calculations:

- Although not calculated (since the VE team tentatively has not included the combined FM option), it is assumed that the cost implications combining and shortening force mains would result in a small savings as well as creating a gravity sewer section near the STP

Alternative Sketch: Alternative Pumping Station Locations (in BLUE)

SECTION FIVE PRESENTATION PHASE AND WAY FORWARD

PRESENTATION PHASE

The hallmark of an effective VE study is the functional evaluation process and the breadth and depth of the VE alternatives brought forth. These results provide alternative solutions for EFC, the Town and its PDT to consider, as well as indirectly confirming the validity of the current design for the project. The VE team's results portray the value-added benefits that can be realized by the Town and will provide guidance in optimizing the project's design.

On October 15, 2021, the VE team presented the results of the workshop to representatives from EFC, the Town, and NP&V and others that are part of the design team. The sign-in sheet for this meeting is provided in Appendix B and the results of the discussion are provided in Appendix D. The purpose of the meeting was to explain each of the developed VE proposals and design suggestions. The dialogue and cooperative interaction between the VE team, the design team, the EFC, and the Town addressed questions about our analysis and provided reviewers with additional insight into the nature of the alternatives enabling them to make a more informed decision as to whether to implement the concepts brought forth.

WAY FORWARD

Value engineering, by its nature, searches for new, unique, and different methods to provide the needed project functions at the lowest total life cycle cost and eliminate those functions that do not benefit the completed work. The alternative design schemes and construction methods presented by the VP team may impact the final scope of work, design documents, budget, schedule, functionality, and appearance of the project. The task of the VP team is primarily to identify possible solutions or enhancements. Whereas, the task of the Town and the PDT is to choose the most favorable of the VE proposals and design suggestions and integrate these ideas into the remainder of the design.

Therefore, decisions are needed on each of the proposals and design suggestions presented in this report. During the review of the study results, the reader should consider each part of a proposal on its own merit. Each area within an alternative proposal that is determined to be acceptable should be considered for inclusion in the final design, even if the entire alternative proposal is not implemented. Variations of these alternatives by the PDT are encouraged. The goal is for all participants involved in this project to work towards an improved final product.

Note that all the alternative proposals were developed independently to provide a broad range of options to consider for implementation. Therefore, some of them are mutually exclusive, so acceptance of one may preclude the acceptance of another. In addition, some of the alternatives may be interrelated, so acceptance of one or more may not yield the total of the cost savings shown for each alternative.

The reader should evaluate all alternatives carefully to select the combination of ideas with the greatest beneficial impact on the project. Once this has been accomplished, the total cost savings resulting from the VE study can be calculated based on implementing a revised, all-inclusive design solution.

Prior to this final report, the draft alternatives report with detailed information on each alternative was submitted. This recommended proposals report, as well as this final report, provide the necessary information to facilitate identification and evaluation of which VE recommendations should be included in the final design.

APPENDIX A

VALUE ENGINEERING (VE) PLANNING WORKSHOP AGENDA

Arcadis U.S., Inc. will conduct a three-day value planning workshop on the Riverside Revitalization Sewage Treatment Plant located in Riverside, NY. The project is being evaluated by Nelson & Pope – Engineers & Surveyors and will be at a preliminary concept level of design at the time of the study that will be conducted September 14-16, 2021. The workshop will take place at the Town of Southampton facilities in Southampton, NY – specifically the lower-level meeting room of Town Hall at 116 Hampton Road in Southampton.

Nelson & Pope will present the conceptual design at the beginning of the workshop and will be available throughout the three-day study effort. Representatives from NYS EFC, the Towns of Southampton and Riverside, and other stakeholders are encouraged to attend this workshop (specifically the in-brief meeting on Day One and the out-brief meeting on Day Three).

AGENDA

Day One	**Tuesday, September 14, 2021** **Objective for the day: Overview of the project and a deep dive into the value planning concepts to be evaluated including function analysis and developing creative function-based solutions**	
9:30 am	**NYS EFC and Southampton Introductory Comments** **Stakeholder and VE Team Introductions** **VE Process, Workshop Organization and Agenda** **Objectives of the Workshop**	**All**
10:00 am *Information Phase (in-brief meeting)*	**Project Overview - General** • Purpose and Need • Goals and objectives • Constraints • Cost Estimate • Questions and Answers **Project Overview - Specific** • Areas for discussion o Groundwater concerns o Discharge requirements o Facility and collection system layout	**VE Team, Project Design Team (PDT) and all Stakeholders**
11:00 am *Information Phase*	**Site Visit** • Understand the surrounding environment and project constraints • Visualize operations and maintenance impacts and connection to surrounding neighborhood • Document observations for remainder of VE methodology	**VE Team**
12:00	**Lunch**	
1:00 pm *Function Analysis Phase*	**Define and Analyze Functions** • Review project cost models and resolve function, location, scope and cost affecting project execution • Define key project and system functions (use verb/noun approach) • Proposals driven from project functions • Define project risks	**VE Team**
3:00 pm *Creative Phase*	**Generate Creative Ideas** • Brainstorm alternative ways to perform key functions • Brainstorm ways to improve value of key functions • Identify mitigating strategies to alleviate risks	**VE Team**
5:00 pm	**Adjourn**	

Day Two	Wednesday, September 15, 2021 Objective for the day: Evaluate and develop valuable ideas and concepts	
8:00 am *Creative Phase*	**Generate Creative Ideas (cont'd)** • Brainstorm alternative ways to perform key functions • Brainstorm ways to improve value of key functions • Identify mitigating strategies to alleviate risks	**VE Team**
9:00 am *Evaluation Phase*	**Evaluate Ideas** • Discuss advantages and disadvantages for each idea • Score ideas based on predetermined criteria and risks	**VE Team**
11:00 am *Development Phase*	**Developing Ideas into Viable Alternative Proposals** • Assign initial development • Proposals are supported with sketches, calculations (life cycle costing), and text supporting why the proposal is a viable function-induced solution	**VE Team**
noon	**Lunch**	
1:00 pm *Development Phase*	**Continue Developing Ideas into Viable Alternative Proposals**	**VE Team**
4:30 pm *Development Phase*	**Checkpoint call with NYS EFC to discuss concepts being developed**	**VE Team and NYS EFC**
5:00 pm	**Adjourn**	

Day Three	Thursday, September 16, 2021 Objective for the day: Finalize VE proposals and present findings	
8:00 am *Development Phase*	**Finalize Development of Recommended Alternative Proposals** • Review status / progress check on alternatives • Wrap-up alternative development and peer review all alternatives • ***All proposals finished by 1 pm***	**VE Team**
noon	**Lunch**	
1:00 pm *Presentation Phase*	**Finalize Materials** • Develop presentation material and Summary Table of Alternatives • Workshop team reviewing all alternatives	**VE Team**
3:00 pm *Presentation Phase (out-brief meeting)*	**Presentation of VE Planning Findings** • Team presents alternative proposals to NYS EFC/Southampton • Questions and answers • Review of open items and responsibility • Review of schedule	**VE Team, PDT, and all Stakeholders**
5:00 pm	**Adjourn**	

POST-WORKSHOP PHASE

Upon completion of the value engineering workshop, Arcadis will prepare a draft of the Value Engineering Proposals Reports and submit an electronic copy of the draft to NYS EFC within five working days. This will be followed by a consensus call (to be scheduled around September 30th) and the preparation of the Value Planning Study Final Report for submittal to NYS EFC and the Design Team within 7 working days after the consensus call. The final report will include, but not be limited to, the following material:

- Project description and design concept
- Value engineering team members and participants from the owner and designer organizations

- Cost models and function analysis worksheets
- Creative idea listing and evaluation of the ideas generated
- Descriptions of the original design and alternative proposals, including sketches, description of value gained with the proposed alternative, design calculations and initial and life cycle cost estimates
- Procedures to implement value engineering alternative proposals
- Potential contract savings (capital construction and life cycle costs)

The Design Team will review the VE alternatives and identify those they accept, or accepted in a modified form or rejects, providing a rationale for any ideas rejected. Simultaneously, NYS EFC and the Town of Southampton representatives will review the VE proposals and formulate their comments. The organizations will meet to finalize implementation decisions and summarize the outcome of the VE effort. Arcadis can support the implementation meeting as needed.

OUTLINE FOR VALUE PLANNING TEAM PRESENTATION

The designer, the Client, and the VE team are all actively involved in the planning and design of the project and are vested in providing the best solutions available to make each and every project a success. The designer/planner has spent a great deal of time and effort in studying, developing the conceptual design and their insight is invaluable in further evaluating the options and alternatives that could potentially be implemented.

The design, typical for most projects, is influenced by outside input from many sources. To perform our work most efficiently, the value engineering team needs to understand the factors that have influenced the design to date. The goal is to avoid duplication of efforts and to aid the VE team in becoming familiar with the project.

To achieve this objective, the designer is asked to give a presentation at the beginning of the VE workshop session on Day One (specifically at 10 am on Day One). To assist the designer, the following information, at a minimum, is listed to guide the discussion:

- Scope of the designer's effort
- Participating firms
- Existing site conditions
- Regulatory requirements
- Basis of design
- Rationale and steps in development of design
- Design concepts for civil, landscaping, etc.
- Pertinent information from user participation
- Constraints imposed by the Owner
- Appropriate codes
- Explanation of information provided by the Designer to the VE team
- Summary of cost estimate
- Construction phasing
- Challenging design elements that the Designer recommends the VE team review or explore further to validate or improve the existing design

This information is provided as an outline to aid the discussion. The presentation is the designers' responsibility, and they may conduct the initial presentation in the manner they feel most comfortable.

APPENDIX B

EXHIBIT K
ESTIMATED COLLECTION AND PUMPING SYSTEM LAYOUTS

NELSON & POPE
ENGINEERS & SURVEYORS
572 WALT WHITMAN ROAD, MELVILLE, N.Y. 11747
PHONE (631) 427-5665 FAX (631) 427-5620
WWW.NELSONPOPE.COM

NO.	DATE:	REVISIONS:	BY:
-	-	-	-

P.E. SEAL AND SIGNATURE

OVERALL SITE PLAN

FOR

RIVERSIDE STP

SITUATED AT

RIVERSIDE

TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NEW YORK

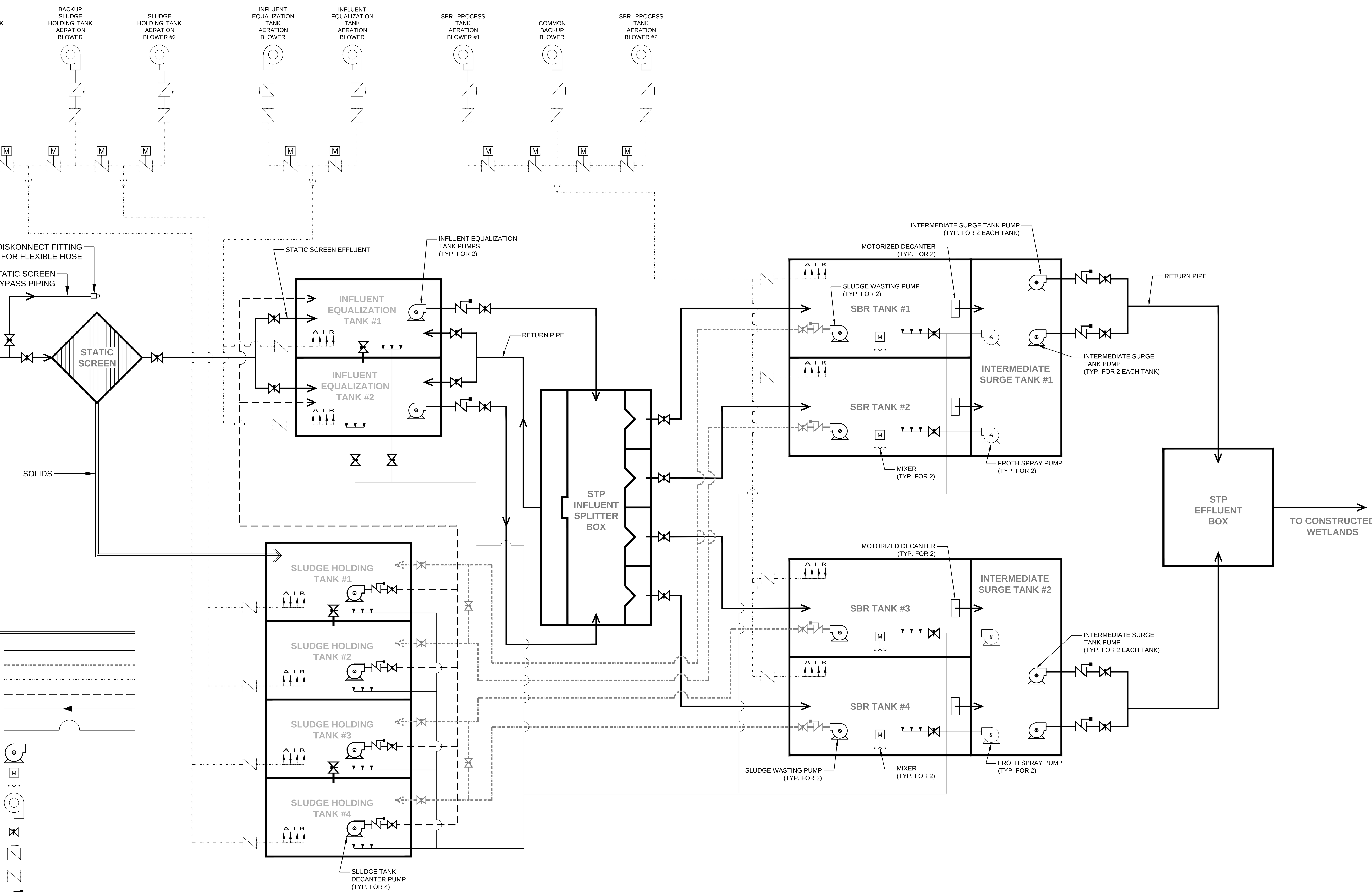
S.C.T.M. NO.: DIST. 0900, SECT. 141, BLOCK. 1, LOT 9.6 & 9.7

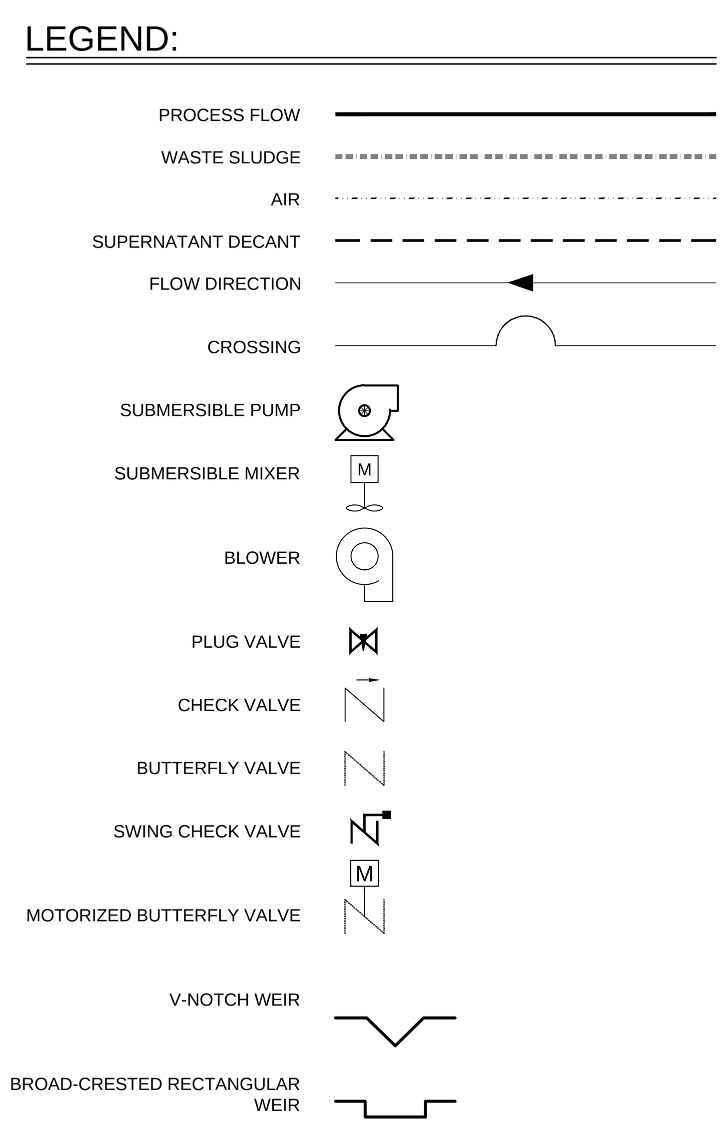
PROJECT NO.:	15128
DRAWN BY:	DRF
CHECKED BY:	TFL
DATE:	4/3/17
SCALE:	1" = 300'
FILE NO.:	-
CADD:	15128SP

SHEET NO.:

EX K-1

EXHIBIT L
PROPOSED FLOW SCHEMATIC





STP FLOW SCHEMATIC

(NOT TO SCALE)

NELSON & POPE
ENGINEERS & SURVEYORS
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WWW.NELSONPOPE.COM

NO.	DATE:	REVISIONS:	BY:
-	-	-	-

P.E. SEAL AND SIGNATURE

STP FLOW SCHEMATIC
FOR
RIVERSIDE STP
SITUATED AT
RIVERSIDE
TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NEW YORK

S.C.T.M. NO.
DIST. 0900, SECT. 141, BLOCK. 1, LOT 9.6 & 9.7

PROJECT NO.:	15128
DRAWN BY:	DRF
CHECKED BY:	TFL
DATE:	4/3/17
SCALE:	AS NOTED
FILE NO.:	-
CADD:	15128FLOW
SHEET NO.:	

EXHIBIT-L

EXHIBIT M
STP SITE PLANS

NELSON & POPE
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WWW.NELSONPOPE.COM

NO.	DATE:	REVISIONS:	BY:
-	-	-	-

P.E. SEAL AND SIGNATURE

OVERALL SITE PLAN
FOR
RIVERSIDE STP
SITUATED AT
RIVERSIDE
TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NEW YORK

S.C.T.M. NO.: DIST. 0900, SECT. 141, BLOCK. 1, LOT 9.6 & 9.7

PROJECT NO.:	15128
DRAWN BY:	DRF
CHECKED BY:	TFL
DATE:	4/3/17
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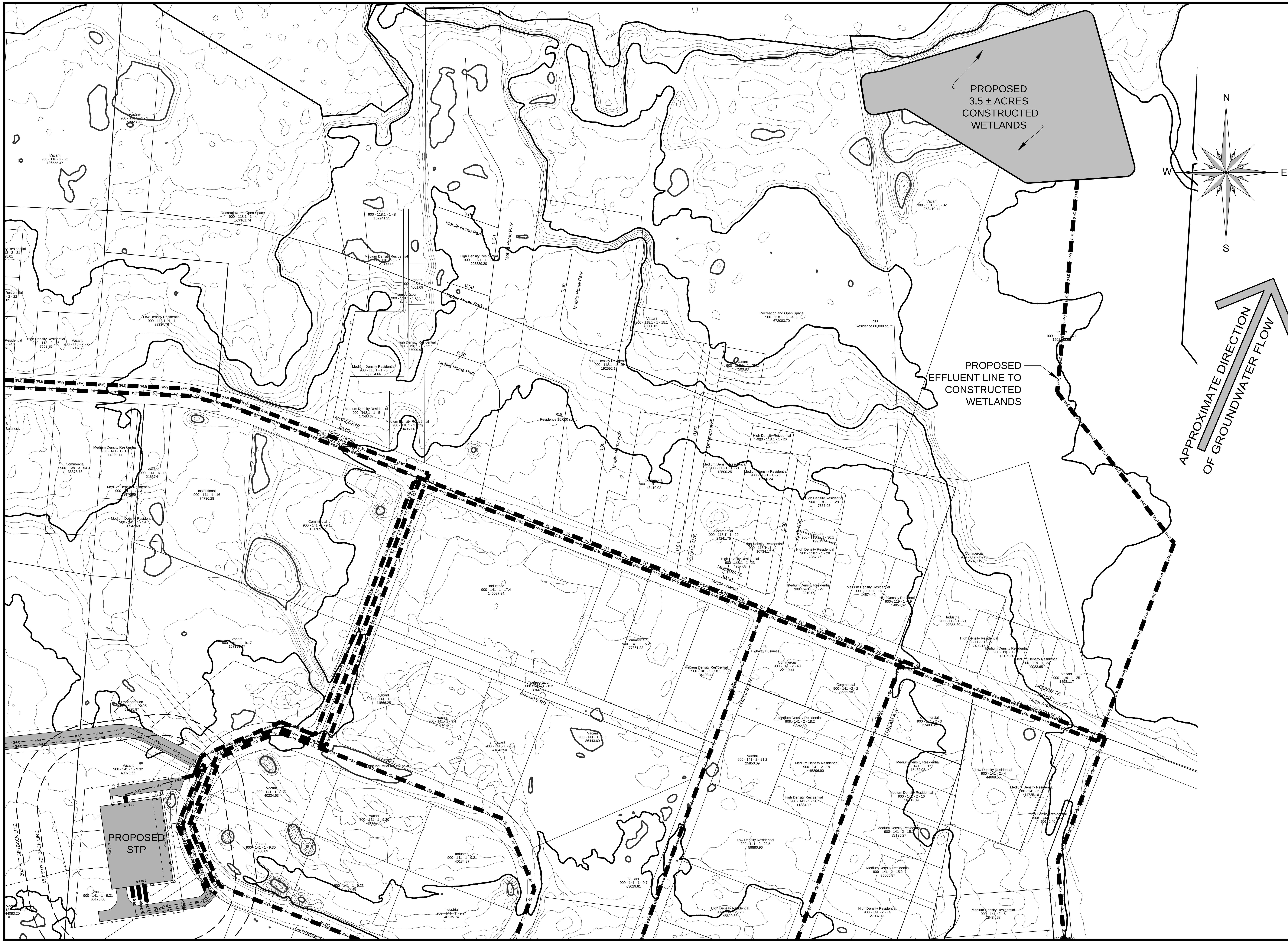
FILE NO.:	-
CADD:	15128SP
SHEET NO.:	EX M-1



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NO.	DATE:	REVISIONS:	BY:
-	-	-	-

P.E. SEAL AND SIGNATURE

STP SITE PLAN

FOR

RIVERSIDE STP

SITUATED AT

RIVERSIDE

TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NEW YORK

S.C.T.M. NO.: DIST. 0900, SECT. 141, BLOCK 1, LOT 9.6 & 9.7

PROJECT NO.:	15128
DRAWN BY:	DRF
CHECKED BY:	TFL
DATE:	4/3/17
SCALE:	1" = 100'
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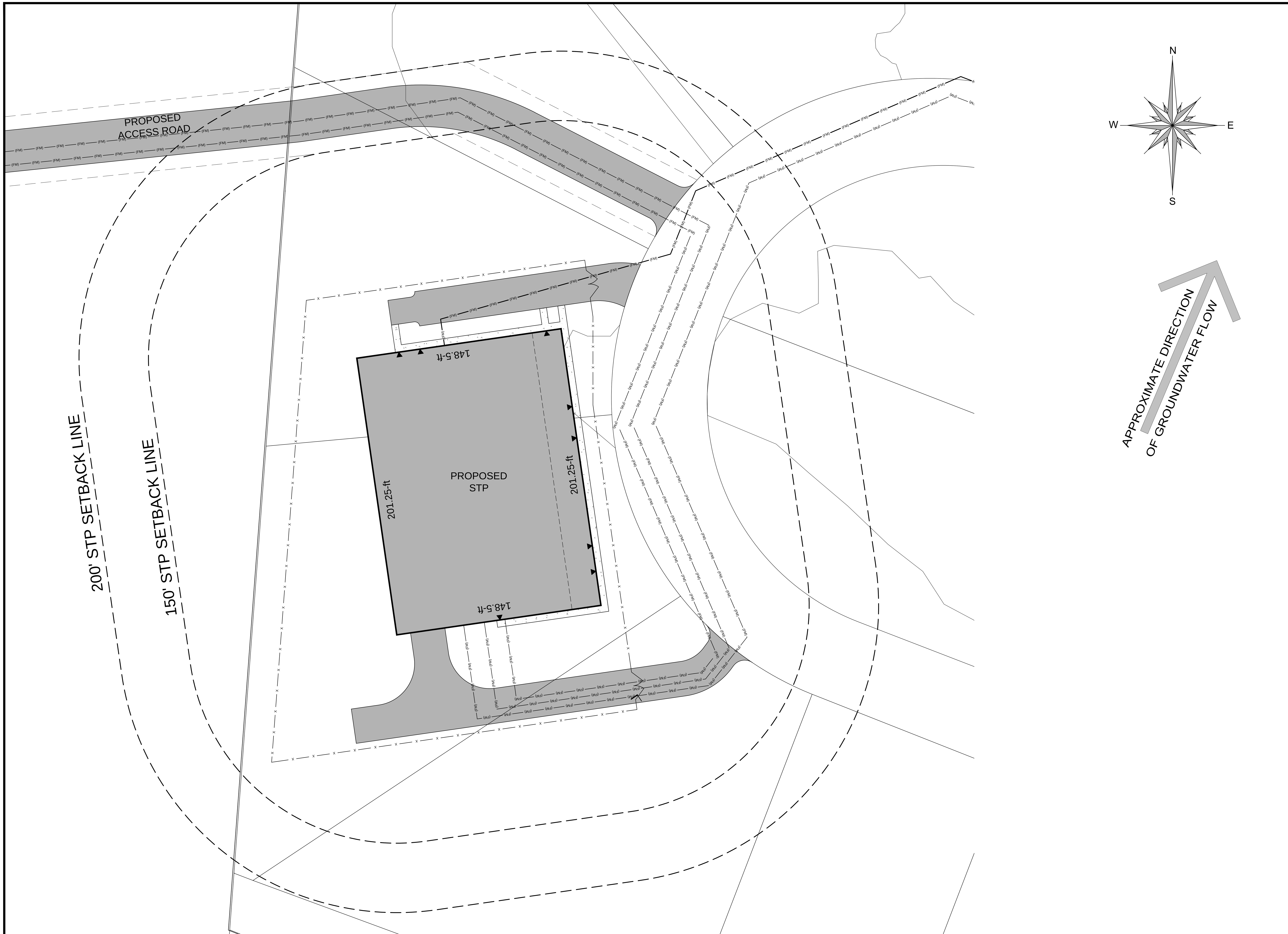
CADD:	15128SP
SHEET NO.:	EX M-2



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NO.	DATE:	REVISIONS:	BY:
-	-	-	-

P.E. SEAL AND SIGNATURE

STP PARTIAL SITE PLAN

FOR
RIVERSIDE STP
SITUATED AT
RIVERSIDE
TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NEW YORK

S.C.T.M. NO.: DIST. 0900, SECT. 141, BLOCK. 1, LOT 9.6 & 9.7

PROJECT NO.:	15128
DRAWN BY:	DRF
CHECKED BY:	TFL
DATE:	4/3/17
SCALE:	1" = 100'
FILE NO.:	-
CADD:	15128SP
SHEET NO.:	EX M-3

ARCHITECTURAL PLAN

SCALE: 1/8"=1'-0"

NELSON & POPE

ENGINEERS & SURVEYORS
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NO.	DATE:	REVISIONS:	BY:
-	-	-	-

P.E. SEAL AND SIGNATURE

STP ARCHITECTURAL PLAN
FOR
RIVERSIDE STP
SITUATED AT
RIVERSIDE
TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NEW YORK

S.C.T.M. NO. DIST. 0900, SECT. 141, BLOCK. 1, LOT 9.6 & 9.7

PROJECT NO.:	15128
DRAWN BY:	DRF
CHECKED BY:	TFL
DATE:	4/3/17
SCALE:	1/8" = 1'-0"
FILE NO.:	-
CADD:	15128FL
SHEET NO.:	EX M-4

NELSON & POPE

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WWW.NELSONPOPE.COM

NO.	DATE:	REVISIONS:	BY:
-	-	-	-

P.E. SEAL AND SIGNATURE

STP AERIAL SITE PLAN

FOR

RIVERSIDE STP

SITUATED AT

RIVERSIDE

TOWN OF SOUTHAMPTON, SUFFOLK COUNTY, NEW YORK

S.C.T.M. NO.: DIST. 0900, SECT. 141, BLOCK. 1, LOT 9.6 & 9.7

PROJECT NO.:	15128
DRAWN BY:	DRF
CHECKED BY:	TFL
DATE:	4/3/17
SCALE:	1" = 100'
FILE NO.:	-
CADD:	15128SP
SHEET NO.:	EX M-5

APPENDIX C

PROJECT: Riverside STP Value Planning Workshop ARCADIS

Pre-Workshop Planning Meeting: September 10, 2021
In-Brief: September 14, 2021
Out-Brief: September 16, 2021
Implementation Meeting: October 15, 2021

Pre-Workshop Meeting	In-Brief	Out-Brief	Implementation Meeting	Name	Organization
	X		X	Frank Zapone	Town of Southampton
X	X	X	X	Tom Lembo	Nelson and Pope
	X			Kyle Kern	Nelson and Pope
	X			Sean McLean	Rennaissance
	X	X		Ela Kokonal	Rennaissance
X	X	X	X	Dani Baldwin	New York State EFC
	X	X		Kaitlyn Penner	New York State EFC
	X	X		Marnie Chancey	New York State EFC
		X		Tim Burns	New York State EFC
			X	Dave Wilcox	Town of Southampton
	X			Ryan Porter	Rennaissance
	X	X		Mike Lieberman	Town of Southampton
X	X	X	X	Janicer Scherer	Town of Southampton
X	X	X	X	Anthony Dunams	Arcadis U.S., Inc.
	X	X		Bill Wollman	Arcadis U.S., Inc.
	X	X		Mike Lynch	Arcadis U.S., Inc.
	X	X		Mike Kosier	Arcadis U.S., Inc.
	X	X		Steve Feldman	Arcadis U.S., Inc.
	X	X		Russ Mereo	Arcadis U.S., Inc.
	X	X		Joe Husband	Arcadis U.S., Inc.
X		X	X	Matt Yonkin	Arcadis U.S., Inc.
			X	Carrie O'Farrell	Nelson, Pope & Vooris
			X	William Brizzell	New York State EFC

APPENDIX D

Value Engineering Recommendation Approval Form

30065414: Riverside STP

VE Study Date: September 14-16, 2021

VE Proposal		Decision		Design Decision Review	Functional Benefit*						
ID	Description	Accept, Reject, or Further Review Req'd (A/R/F)	Reason for acceptance or rejection (Or use the pages at the end of this form)	Agree or Further Discussion	Safety	Operations	Environment	Construction	Other	VE Team Estimated Savings or Cost Avoidance (-) or Cost Added (+)	Actual Estimated Savings or Cost Avoidance (-) or Cost Added (+)
CW-1	Provide Injection Gallery In lieu of Constructed Wetlands	F	Cost assumptions must be verified. Need to ensure meeting CPB discharge requirements (2.5 mg/l max) – leading to a hardship waiver/exemption (		X	X	X	X		-$918,000	
CW-2	Evaluate proposed constructed wetland location for potential constraints	F	N&P will evaluate in the supplemental SEQRA.		X	X	X			Design Suggestion	
TP-5	Confirmation of liquid and solids treatment/process assumptions and calculations	F	Engineer will confirm the assumptions and calculations.			X				Design Suggestion	
TP-7	Expand and confirm biosolids management at Riverhead WRRF	F	Will discuss with Riverhead. A politics and agreement issue (IMA). Key issue is volume and processing. RH plans to accept outside waste.		X	X		X		Design Suggestion	
TP-8	Incorporate a gravity belt thickener at the plant to reduce sludge volume and subsequent sludge management costs assessed by Riverhead	A	Engineer will confirm costs and process			X				$330,000 with annual LCC savings due to operations of GBT	
TP-10	Expansion of Riverhead WRRF and Riverside flow diversion	F	Will discuss with Riverhead (share funding for expansion). Needs to address representation.		X	X		X		-$1,370,000	
TP-11	Remove generator room from new treatment plant building and place outside of the building and repurpose space	A	Design modification- engineer will confirm		X	X		X		Design Suggestion	
CS-1	Relocate pumping stations to lower-lying areas to reduce excavation depth	F	Need to assess ownership of lower lying areas and negotiate easements. Needs additional topo and evaluation to make a decision (easement impacts).			X		X		-$303,000	

Value Engineering Recommendation Approval Form

30065414: Riverside STP

VE Study Date: September 14-16, 2021

VE Proposal		Decision		Design Decision Review	Functional Benefit*						
ID	Description	Accept, Reject, or Further Review Req'd (A/R/F)	Reason for acceptance or rejection (Or use the pages at the end of this form)	Agree or Further Discussion	Safety	Operations	Environment	Construction	Other	VE Team Estimated Savings or Cost Avoidance (-) or Cost Added (+)	Actual Estimated Savings or Cost Avoidance (-) or Cost Added (+)
CS-2	Provide gravity sewer near STP in lieu of force mains to influent STP pump station	F	Engineer will confirm – may be beneficial (can be open to combined FMs – add a sewer interceptor (trade-off deeper design potentially))					X		Design Suggestion	

** In addition to cost implications, funding and regulatory agencies requires an evaluation on each approved recommendation in terms of the project feature or features that the recommendation benefits. If a specific recommendation can be shown to provide benefit to more than one feature described below, count the recommendation in each category that is applicable.*

Safety: *Recommendations that mitigate or reduce hazards on the facility.*
Operations*: Recommendations that improve real-time service and/or local or regional levels of service of the facility.*
Environment: *Recommendations that successfully avoid or mitigate impacts to natural and or cultural resources.*
Construction*: Recommendations that improve work conditions or expedite the project delivery.*
Other: *Recommendations not readily categorized by the above performance indicators.*

Please provide justification if the value engineering study recommendations are not approved or are implemented in a modified form.

To facilitate this reporting requirement, a Value Engineering Recommendation Approval Form is included in the Appendix of this report. If the client elects to reject or modify a recommendation, please include a brief explanation of why.

____
Anthony Dunams, PE, CVS - Value Engineering Facilitator

____
Date

Value Engineering Recommendation Approval Form

30065414: Riverside STP

VE Study Date: September 14-16, 2021

______________________________	______________________________
Janice Scherer – Town Planning & Development Administrator Town of Southampton	Date
______________________________	______________________________
Timothy Burns, PE – NYS EFC Director	Date