CLOVEWOOD

Draft Environmental Impact Statement

Appendix I
Wastewater Treatment Report

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I-4 NYSDEC Correspondence

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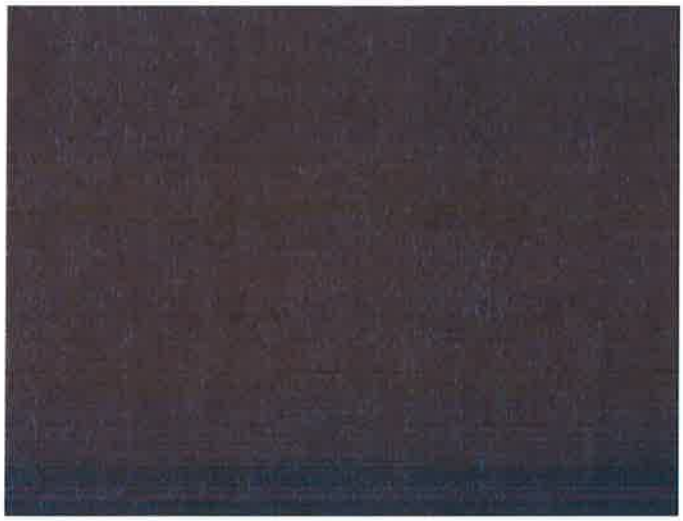

Wastewater Treatment Engineering Report

CLOVEWOOD
Blaggs Clove

Village of South Blooming Grove,
Orange County, New York

June 2018
(Revised February 2019)

Prepared for:

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1 Introduction

Henningson, Durham & Richardson Architecture and Engineering, P.C. (HDR) developed a conceptual design of a new wastewater treatment plant facility (WWTP) for CPC to serve the proposed Clovewood development. This Engineer's Report presents the proposed Clovewood on-site wastewater treatment plant in Blagg's Clove (TM Section 208, Block 1, Lot 2 & 3) within the Village of South Blooming Grove, Orange County, New York.

The Clovewood WWTP is being designed for an average flow of 280,000 gallons per day with secondary biological treatment. This flow is consistent with a letter from the 2014 New York State Department of Environmental Conservation (NYSDEC) Design Standards for Intermediate Sized Wastewater Treatment Systems. The plant is being designed to meet the NYSDEC intermittent stream standards, shown herein.

The proposed treatment plant design includes the following treatment process and equipment which are all described herein:

- Mechanical Screens and Grit Removal System
- Fine Screens
- Membrane Bioreactor (MBR)
- Chemical Feed Systems
- Aerated Sludge Holding Tank
- Sludge Press
- Post Aeration Tank
- Ultraviolet Disinfection
- Process Control Building

This Engineer's Report includes the process design drawings, and equipment data sheets to fix the equipment sizing and materials of construction, preliminary plant layout and process control building sizing and layout.

2 Description of Wastewater Sources

The new Clovewood WWTP will treat sanitary wastewater from the proposed Clovewood development. The Clovewood development is a proposed housing development composed of 600 residential lots/dwellings. It is also anticipated that a swimming pool/bath house will be established on the Clovewood site. Accordingly, the average daily wastewater flow is 273,600 gpd at maximum build-out scenario. The selected design average daily flow is 280,000 gpd, as described in detail in Section 5.1.

3 Treatment Objectives

The treated wastewater will be discharged to the un-named class C tributary to Satterly Creek located within the development site. This section presents the development of the treated effluent quality requirements.

3.1 Treated Effluent Permit Limits

A Waste Assimilation and Capacity (WAC) Analysis was completed in accordance with NYSDEC Division of Water Technical and Operational Guidance (TOGS) 1.3.5 for two potential sites for the proposed discharge from the new WWTP. As per NYSDEC's response to the WAC Analysis, this site will require intermittent effluent stream limits summarized in Table 3-1. These are considered preliminary effluent limits and will be finalized after the NYSDEC receives the Draft State Pollution Discharge Elimination System (SPDES) application and all other required NYSDEC applications associated with the site have been submitted and deemed complete per Uniform Procedures Act (UPA) and State Environmental Quality Review (SEQR) has been satisfied.

Table 3-1. Preliminary Effluent Limits

Parameter	Unit	NYSDEC Intermittent Stream Effluent Limits
BOD_5 (Daily Max)	mg/L	5
TSS (Daily Max)	mg/L	10
Settleable Solids (Daily Max)	ml/L	0.1
pH (Range)	SU	6.5 – 8.5
Dissolved Oxygen	mg/L	≥ 7.0
Ammonia		
Summer	mg/L as NH_3-N	1.5
Winter	mg/L as NH_3-N	2.2
Total Phosphorus	mg/L as P	0.5
Fecal Coliform (30-d geo mean)	# colonies/100 mL	200
Fecal Coliform (7-d geo mean)	# colonies/100 mL	400

4 Existing Treatment Facilities

This project is for a new residential development, and therefore, there is no existing treatment facility.

5 Development of Treatment Facility Design Parameters

This section presents the development of the design basis and was developed based on guidelines and standards from the following references:

- *NYSDEC Design Standards for Intermediate Sized Wastewater Treatment Systems*, March 2014 (ISWTS).
- Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (GLUMBR) *Recommended Standards for Wastewater Facilities (Ten State Standards)*, 2014 Edition.

- New England Interstate Water Pollution Control Commission *Guides for the Design of Wastewater Treatment Works –Technical Report-16 (TR-16),* 2011.
- Wastewater Engineering, Metcalf & Eddy, 2004.

5.1 Design Flow

The Clovewood development project is a proposed 600 single-family residential lot subdivision. The average daily wastewater flow is based on an average water demand for the Clovewood project of 110 gallons per day per bedroom (gpd/bedroom). The average water demand for the proposed 600, 4-bedroom residential units with a water usage of 110 gpd/bedroom is 264,000 gpd or 183.3 gallons per minute (gpm).

The applicant may also consider the inclusion of swimming pools/bath houses in the proposed development. According to the 2014 NYSDEC "New York State Design Standards for Intermediate Sized Wastewater Treatment Systems", the water usage rate for a swimming pool/bath house is based on 10 gpd per swimmer, and with an allowed 20% reduction of that rate for the use of water saving fixtures. A water demand requirement for the potential swimming pools/bath houses have been calculated assuming 2 swimmers per residential unit, which results in a water demand of 9,600 gpd or 6.7 gpm (2 swimmers x 600 units x 10 gpd/swimmer x 20% reduction for use of water saving fixture = 9,600 gpd).

Flow projections used to determine loading are presented in Table 5-1 below. The wastewater treatment facility will be designed to handle the wastewater at maximum build-out scenario, which will be an average daily wastewater flow of 280,000 gpd based on the above mentioned standard per-unit hydraulic loading rates. Peaking factors were estimated based on published curves used for estimating peak hourly flow rates from domestic sources[1].

[1] Metcalf & Eddy, Wastewater Engineering Treatment and Reuse, 4th Edition, 2004, 13 Peaking Factor Curve (pg 202).

Table 5-1. Revised Average Design Flow Calculation

Type of Use	Unit	Hydraulic Loading Rate[1] Unit (Gallons per day)	Number of Units	Hydraulic Loading Rate per Residence/Apt (Gallons per day)	Number of Residence/Apt	Average Daily Flow
Single Family Residence	Per Bedroom	110	4	440	600	264,000
Swimming Pool/Bath House	Per Swimmer/Bather	8	2	16	600	9,600
Total				456	600	273,600[4]
SELECTED DESIGN AVERAGE DAILY FLOW (gpd)						280,000[4]
MAXIMUM DAILY FLOW (gpd)[2]						560,000
PEAK HOURLY FLOW (gph)[3]						560,000

Notes:

[1] Based on NYSDEC 2014 “New York State Design for Intermediate Sized Wastewater Treatment Systems””

[2] Based on Peaking Factor = 2.0

[3] Based on Peaking Factor = 3.33

[4] Sum of flows = 273,600 gpd. 280,000 gpd allows for a 6,400 gpd addition for possible future development either on-site or nearby.

5.2 Influent Wastewater Characteristics

Influent wastewater characterization was based on mass loadings at 110 gpd per bedroom in typical average strength residential wastewater.

A minimum design temperature of 10 degrees Celsius was selected based on an evaluation of average winter wastewater temperatures in the vicinity of the Clovewood development.

Table 0-1 presents a summary of the concentration ranges for each parameter.

The influent WWTP loading rate is based on average of the concentration ranges and the design average flow of 280,000 gpd from residential sources.

Table 0-1. Influent Wastewater Characterization

Parameter		Revised Concentrations - 1/19/2018				
		Based on: 280,000 gpd			Effluent Limits	Average Loading Rate (lb/d)
		Residential Wastewater Average Concentration Range				
		Min	Max	Avg		
		mg/L	mg/L	mg/L	mg/L	Avg Load@ 280,000 gpd
Temperature	deg C					10
Total Solids	TS	778	1369	1073		2506
Total Volatile Solids	TVS	436	583	510		1191
Total Suspended Solids	TSS	241	513	378	10	883
Total Volatile Suspeneded Solids	VSS	171	412	292		682
5-day Biochemical Oxygen Demand	BOD_5	241	445	344	5	803
Chemical Oxygen Demand	COD	778	1027	902		2106
Total Nitrogen	TN	40	117	79		184
Ammonia	NH_4	6	20	13	1.5	30
Nitrates and Nitrates	NO_2-N, NO_3-N	<1	<1	<1		<1
Total Phosphorus	TP	9	19	14	0.5	33
Fats, Oils and Grease	FOG	109	163	136		318
Volatile Organic Compounds	VOC	0.2	0.5	0.3		0.7
Surfactants	-	14	28	21		49
Total Coliforms (MPN/100 mL)	TC	1.00E+08	1.00E+10	5.05E+09	200	-
Fecal Coliforms (MPN/100 mL)	FC	1.00E+06	1.00E+08	5.05E+07		-

New York State Department of Environmental Conservation 2014 “New York State Design Standards for Intermediate Sized Wastewater Treatment Systems" and EPA 2002 “Onsite Wastewater Treatment Systems Manual” Concentrations were derived based on pollutant loads proportioned to 110 gpd/bedroom.

6 Alternatives Evaluation

This section provides a summary of the alternatives evaluation comparing MBR and SBR biological treatment for Clovewood WWTP. The alternatives were compared relative to both costs and non-costs criteria, as well as key advantages and disadvantages. The alternatives evaluation was completed and costs provided in this Section were developed in December 2015.

6.1 Alternative 1 – Membrane Bioreactor (MBR) Process

The membrane biological reactor (MBR) process is a two stage suspended growth aerobic biological treatment system featuring a biological reactor (bioreactor) followed by separation and retention of the mixed-liquor suspended solids (MLSS) or biomass in the bioreactor by using membrane filtration. The MBR is essentially activated sludge biologically treated in which the secondary clarifier is replaced by membranes. The membrane filtration following the bioreactor provides the treatment mechanism required to retain a very high level of MLSS allowing the MBR process to operate at very low loadings and high solids retention times (SRTs) which results in smaller footprints than conventional extended aeration systems.

This alternative has the following advantages and disadvantages:

Advantages:

- Excellent effluent quality compared to other activated sludge technologies. Provides high level of treatment in the bioreactor along with suspended solids retention by the membrane to result in a highly refined effluent with very low levels of biochemical oxygen demand (BOD) and total suspended solids (TSS);
- Occupies smallest footprint compared to conventional activated sludge technologies;
- Ease of operation, system can accommodate varying flows and loads;
- Low solids generation;
- Provides phosphorus removal to meet SPDES limits without additional filtration system;
- Stable process; and
- Expandability and ability to be constructed in phases based on development build-out.

Disadvantages:

- High O&M requirements for membrane cleaning and replacement;
- Additional chemicals required for CIP process; and
- Complexity of Instrumentation and Controls (I&C) compared to SBR technology.

6.2 Alternative 2 – Sequencing Batch Reactor (SBR) Process

The Sequencing Batch Reactor (SBR) process is a modification of the activated sludge process. The basic treatment steps (aeration, sedimentation and clarification) are identical to other activated sludge processes. The key difference is most other activated sludge processes accomplish treatment continuously in space using multiple tanks while the SBR accomplishes all treatment steps in one tank through sequencing stages over time. It is a fill and draw system and includes a fill step (can be aerated, un-aerated or both), react step (substrate oxidation under aeration), a settling step (and effluent clarification) and decant step (where clarified effluent is discharged).

Since all treatment steps are accomplished in one tank, separate settling/clarification tanks and return sludge pumping is not needed. Therefore, there is less mechanical equipment and facilities to operate and maintain. Because the settling is done in a batch process, ideal settling conditions are achieved and the tanks are not subject to short-circuiting and density currents common in conventional, continuous flow secondary sedimentation/clarification processes.

The SBR system operates in a plug flow condition, which achieves rapid biodegradation of the organic load resulting in shorter reaction time. Nutrient removal can be accomplished through cycle and aeration time adjustment without equipment or basin modifications.

This alternative has the following advantages and disadvantages:

Advantages:

- Simple process, easy to automate and requires less operator attention compared to MBR;
- Provides large operational flexibility; and
- Can accommodate varying flows.

Disadvantages:

- Large tank volumes required compared to MBR alternative;
- Equalization tank is required for the effluent; and
- Requires addition of tertiary filter to meet phosphorus limits.

6.3 Alternatives Evaluation Criteria

The evaluation criteria for the alternatives included:

- Ability to consistently meet SPDES permit limits;
- Sustainability / Utility requirements;

- Expandability for future flows;
- WWTP Footprint requirements;
- Chemical requirements;
- Quantity of sludge and residuals generated and ease of sludge handling;
- Automation and process control;
- Maintenance requirements;
- Ease of operation;
- Constructability; and
- Performance guarantee.

6.4 Comparison of Costs

Table 6-1 presents a comparison of the total capital costs and annual O&M costs for Alternative 1 and 2 prepared as part of the separate Wastewater Alternatives Evaluation report. The total cost is also shown for comparison. The total costs are within approximately 15% of one another. The cost in Table 7-15 has been updated since the Alternatives Evaluation as the conceptual design was progressed.

Table 6-1. Cost Comparison Summary

Alternative	Description	Total Capital[1]	Total Annual O&M
		($millions)	*($millions)*
1	MBR	6.92	0.46
2	SBR+ Disk Filter	7.95	0.52

6.5 Alternative Selection

The following summarizes the conclusions from the alternatives evaluation:

- Alternative 1 MBR had a capital cost of $25.63/gallon and O&M cost of $1.65/gallon.
- Alternative 2 SBR had a capital cost of $29.49/gallon and O&M cost of $1.869/gallon.
- Alternative 1 and 2 capital costs have an approximately 15% difference.
- It is recommended to proceed with the conceptual design for the MBR system as it provides the highest quality effluent to consistently meet the preliminary SPDES discharge limits proposed by NYSDEC for intermittent streams.

7 Design of Treatment System

This section provides a summary of the WWTP conceptual design utilizing the membrane biological reactor (MBR) process, as selected in Section 6.

7.1 Treatment System Overview

The proposed WWTP utilizes a MBR for BOD and TSS removal and nitrification. Influent will be screened prior to entering the MBR system. The MBR process is a single stage suspended growth aerobic biological treatment system featuring biological reactors (bioreactor) followed by separation and retention of the mixed-liquor suspended solids (MLSS) or biomass in the bioreactor by using membrane filtration. MBR permeate will be re-aerated and treated by UV disinfection before discharging to the Class C tributary to Satterly Stream located on the development site.

The major processes and equipment are as follows:

- One (1) mechanical screens and grit removal system with screening dumpster;
- Two (2) Fine Screens (2 mm perforated plate openings) for MBR protection;
- Two (2) Bioreactor/Aeration Tanks with fine bubble diffused aeration and blowers;
- Two (2) Membrane Cassette Tanks (includes membrane modules in series, feed and recycle pumps, scour blowers);
- Membrane Cleaning System – Clean-in-Place (CIP) tank, circulation pumps, chemical storage tanks and feed pumps to the CIP tank;
- pH and nutrient chemical feed systems;
- Aerated sludge holding tank with course bubble diffusers and blower;
- Sludge Dewatering System with Polymer Feed System;
- Ultraviolet Disinfection; and
- Post Aeration Tank and Blower.

A building will be provided to house the permeate pumps, UV disinfection reactors, MLSS recycle pumps, aeration blowers, scour blowers, membrane system compressor and dryer, membrane cleaning systems, MCC, laboratory, and office. A separate sludge building with odor control will be provided for the sludge handling equipment.

Appendix A includes a process flow diagram and a site plan for the Clovewood WWTP. As shown in FEMA Flood Insurance Rate Map in Appendix B, the proposed WWTP is located well above the 500-year flood plain and will have a minimized risk of process impairment or contamination during flooding. The treatment units will be located far from the existing buildings and property line, as recommended in NYSDEC Design Standards for Intermediate Sized Wastewater Treatment Systems, March 2014.

7.2 Process Sizing and Descriptions

7.2.1 Influent Headworks

The raw wastewater will flow from the sewer collection system to the head of the WWTP by gravity. The influent headworks facilities will provide pretreatment to remove large particles in the influent to protect downstream pumps, valves, pipes, and other appurtenances from damage and clogging.

A combined headworks system will provide two-stage influent screening, screenings dewatering and aerated grit removal. Two units of combined headworks system will be installed; each with the ability to handle the design peak hourly flows with the inclusion of any WWTP drainage or return flows. An emergency bypass to a manually cleaned bar screen will be provided.

The influent headworks will consist of the following components:

- Mechanically cleaned influent screen;
- Manually cleaned bar screen;
- Aerated grit removal tank;
- Screenings and grit dewatering system;
- Utility water connection and hose station for washdown; and
- Dumpster area.

Screenings and dewatered grit will be discharged to dumpsters located on a concrete pad adjacent to the headworks facility. An access platform for inspection and maintenance of the screens will be provided. The design criteria for the headworks are presented in Table 7-1. An equipment cut sheet is included in Appendix C.

Table 7-1. Headworks Info

No. of Headworks System:	1 operating
Vendor Basis of Design:	WesTech CleanFlo™ All-In-One Model TSF6-80
Hydraulic Capacity:	1.4 MGD (peak hour)
Screen Type:	Shaftless spiral
Screen Size:	6 mm perforated
Controls:	Vendor supplied control panel
Screenings Handling:	Integral washing / compaction with screenings bagging
Grit Tank Air Supply:	25-45 cfm @ 4.4 psi
Washwater Supply:	8 gpm @ 30-40 psi

7.2.2 Fine Screens

The headworks effluent will flow through a set of fine screens to protect the MBR downstream. Two (2) fine screens (2 mm perforated plate openings) will be provided; each unit with ability to independently operate and treat design peak hourly flow.

The design criteria for the fine screens are presented in Table 7-2. An equipment cut sheet is included in Appendix C.

Table 7-2. Fine Screen Info

No. of Fine Screens:	2 (1 operating, 1 installed standby)
Vendor Basis of Design:	Rotamat® RPPS Perforated Plate Screen
Hydraulic Capacity:	1.4 MGD (peak hour)
Screen Type:	Rotary Drum
Screen Size:	2 mm perforated
Controls:	Vendor supplied control panel
Screenings Handling:	Integral washing / compaction with screenings bagging
Washwater Supply:	25 gpm @ 80 psi per screen

7.2.3 Membrane Bioreactor Tanks

After screening and grit removal, the wastewater will flow to the membrane bio-reactor (MBR) biological treatment system. The headworks effluent initially enters a wet well where the flow is pumped to the MBR system. Two pumps will be provided of the same size (485 gpm each) and have capacities such that with one unit out of service the remaining unit will handle the design average flow and two pumps can handle the peak hourly flow.

Table 7-3. Wetwell Info

HRT @ Average Daily Flow	15 min
Tank Volume	4,375 gallons
Tank Volume	585 CF
Tank Depth	6.0 FT
Tank Width & Length	10 FT

From the wetwell, the wastewater will be split between the two aeration tanks for BOD removal and nitrification. Treated water from the aeration tanks will enter the MBR cassettes tanks for ultrafiltration.

Two trains of MBR cassette tanks are sized to allow:

- One of the two trains capable of treating average daily flow;
- One of the two trains capable of treating the maximum monthly flow for a one week period (maximum monthly flow assumed with a peaking factor of 1.25 to the average daily flow);
- Both trains capable of treating the maximum daily flow for one day; and
- Both trains capable of treating peak hourly flow for duration of one hour.

Permeate from the MBR system is pulled through the membranes via permeate pumps and directed to the post aeration tank. Recycle pumps return the sludge from the membrane cassette tanks to the aeration tanks, where it is mixed with the incoming influent screened wastewater. Excess sludge will be wasted from the system to the sludge storage tank using the recycle pumps. The biological treatment system will have the volumes noted in Table 7-4 below. These tank sizes are consistent with those presented in the GE/Zenon proposal included in Appendix C.

Table 7-4. MBR Tank Volumes

Tank	No. of Tanks	Volume per Tank (gallon)	Total Volume (gallon)
Aeration Tank	2	80,000	160,000
Membrane Tank	2	13,150	26,300

Aeration Tanks

The mixed liquor suspended solids concentration in the aeration tanks is expected to be 8,000 mg/L. The aeration tanks will be provided with fine bubble aeration grids designed to deliver the required range of air rates. Each grid will be fed by a drop leg having a motor operated butterfly valve with open/close service.

Air will be provided by means of a positive displacement (PD) blower system (2 duty + 1 standby). The blowers will be located in the Process Control Building and provided with piping to the respective aeration tanks.

The tanks will have a dissolved oxygen (DO) probes and transmitters for measuring and reporting DO (ranging from 0 to 14 mg/L). A pH probe and transmitter (ranging from 0 to 14 standard units) will also be placed in each aeration tank. A level element with indicating transmitter (ranging from 0 to 15 ft) and a high-high float switch will also be provided in each tank.

To facilitate a means for draining, the tank will be equipped with two (2) nut-operated mud valves accessible from the tank access walkways. Components of the aeration system are provided in Table 7-5 below. Detailed design criteria and control for these components will be provided by the membrane system supplier in the next design phase.

Table 7-5. Aeration System Info

Number of Aeration Tank:	2
Tank Dimension	15 x 55 x 15 (LxWxH), ft, each
Type:	Fixed Floor PVC Flexible Membrane, Fine Bubble Diffusers, Tapered Arrangement, Nominal 9-in. Diameter.
Control:	One Motor Operated Butterfly Valve for drop leg, Open/Close service
Design Air Flow Range per Tank:	365 scfm @ 8.8 psig
Number of Blowers:	3 (2 operating, 1 standby)
Location:	Process Control Building
Type:	Rotary Lobe Positive Displacement
Sound Enclosure:	Manufacturer's standard sound attenuation enclosure included
Silencers:	Inline
Motor:	30 HP

pH Adjustment System

A pH control system will dose sodium hydroxide into the aeration tank in order to maintain a desired pH for optimal biological performance. The MBR system is estimated to require approximately 60 gallons/day of 50% caustic solution. The Process Control Building will include two (2) caustic totes with secondary containment to provide 11-day storage. The chemical system will be designed to meet the requirements of 6 NYCRR Parts 595-599 for storage and handling of hazardous substance.

Table 7-6. pH Adjustment Info

Caustic:	Sodium Hydroxide
Feed Rate:	60 gal/day
Tote Capacity:	Two (2) 330 -gallon for 11 day storage

Coagulant Addition System

The coagulant (alum) dosing system will be provided to feed aluminum sulfate to assist in precipitating phosphorus in the mixed liquor. The precipitate will be filtered in the membrane cassette tanks, preventing phosphorus from entering the effluent stream.

Table 7-7. Coagulant Addition Info

Coagulant:	Alum (Aluminum Sulfate)
Feed Rate:	350 lb/d of active (dry) chemical
Tank Capacity:	840 gallon for 14 day storage

Membrane Cassette Tanks

The mixed liquor suspended solids concentration in the aeration tank is expected to be 10,000 mg/L. Each membrane cassette tank will have a volume of 13,150 gallons and be provided with a motor operated sluice gate, an energy dissipating baffle, two (2) membrane cassettes, a level element with indicating transmitter (ranging from 0 to overflow height), a high-high and low-low level float switch, and a motor operated, outlet sluice gate. To facilitate a means for draining, each tank will be equipped with a motor-operated mud valve accessible from the tank access walkways. Basic details are presented in Table 7-8. For removal and maintenance of the membranes, a jib crane will be utilized.

Table 7-8. Membrane Cassette Design

Vendor Basis of Design:	GE Zenon
Number of Membrane Tank:	2
Tank Dimension:	15 x 9 x 15 (LxWxH), ft, each
Number of Cassettes:	4 (2 per Membrane Tank)
Number of Modules:	184 (92 per Membrane Tank)
Type:	Hollow Fiber, ZeeWeed 500d
Frame Type:	Self-Contained
Materials:	Type 316 Stainless Steel

Scour Blowers

Two duty (one for each membrane tank) scour blowers will be located in the Process Control Building and provide scour for the membranes. The spare aeration blower is used as the spare scour blower. Basic details for the scour blowers are presented in Table 7-9.

Table 7-9. Scour Blower Information

Number of Blowers:	2 (2 Operating, common spare with aeration blower)
Location:	Process Control Building
Type:	Rotary Lobe Positive Displacement
Capacity:	442 scfm @ 6.5 psig
Motor:	20 HP
Sound Enclosure:	Manufacturer's standard sound attenuation enclosure included
Silencer:	Inlet

Permeate Pumps & Tank

The permeate pump system is part of the GE Water membrane system. It consists of a skid mounted system which has two pumps, one per membrane train. A spare shelf unit will be provided. These pumps pull biologically-treated effluent through the membrane cassettes and discharge permeate to the post-aeration tank. The membranes separate the sludge portion of the wastewater from the liquid (treated) portion. The permeate pumps will operate across the entire flow range using VFDs and are capable of providing flow at 1.15 times the peak hour rate. Permeate pump speed is controlled to roughly match the influent flow meter, and is fine-tuned to maintain a consistent level in the membrane cassette tanks. Detailed design criteria and control for the permeate pump will be provided by the membrane system supplier in the next design phase.

Mixed Liquor Recycle Pumps

Mixed liquor will be recycled by the Mixed Liquor Recycle (MLR) Pumps from the Membrane Cassette Tanks to the Aeration Tank. Two (2) operating MLR pumps will be provided by the membrane supplier, with one shelf spare. Flow will be recycled through two return lines, each connecting to the Aeration Tank. Sludge wasting will be accomplished by periodically diverting the mixed liquor from the recycle return line, via manual control. Basic details are presented in Table 7-10. Detailed design criteria and control for the pump will be provided by the membrane system supplier in the next design phase.

Table 7-10. MLR Pump Design

Number of Pumps:	3 (2 duty + 1 shelf spare)
Design Capacity:	922 gpm @ 10 ft TDH
Horsepower:	10 HP

Membrane System Compressor and Dryer System

As part of the membrane system scope of supply, two (1 duty + 1 standby) compressors with dryers will be provided. These compressors will provide air for the membrane system's pneumatically-operated valves, the plant water system, and the sludge dewatering unit and any other membrane system pneumatically-operated equipment. These units will be located in the Process Control Building. For details regarding this system and equipment, refer to the membrane system scope of supply.

Membrane Cleaning System

As part of the membrane system scope of supply, membrane cleaning systems will be provided. Membrane cleaning is manually initiated. There will be one system for citric acid and one system for sodium hypochlorite. The sodium hypochlorite is used to remove organic foulants from the membrane. The citric acid is used to remove inorganic scaling from the membrane. The Process Control Building will include 55-gallon drums and containment pads for these chemicals to provide 14-day storage.

The chemical systems will be designed to meet the requirements of 6 NYCRR Parts 595-599 for storage and handling of hazardous substances. An eyewash and emergency shower will be located near the chemical storage area. The membrane cleaning waste will first be neutralized with mixed liquor, then will be drained manually and pumped to the head of the plant. Also, the permeate pumps will provide backpulse duty to the membrane cassette tanks as needed.

7.2.4 Post Aeration

The permeate pumps will send the MBR permeate to the 29,200 gallon post aeration tank. The tank is designed to provide 30 minutes hydraulic retention time at peak daily flow conditions with an air supply of 20 scfm/1000 gallon capacity as required per NYSDEC Design Standards for Intermediate Sized Wastewater Treatment Systems, March 2014. The fixed diffused aeration system will provide 585 scfm air to increase the dissolved oxygen concentration in the wastewater to 7 mg/L prior to the stream discharge.

The post aeration tank will be provided with fine bubble aeration grids designed to deliver the required range of air rates. Air will be provided by means of a positive displacement (PD) blower system (1 duty + 1 standby). The blowers will be located in the Process Control Building and provided with piping to the tank. The tank will have a dissolved oxygen (DO) probes and transmitters for measuring and reporting DO (ranging from 0 to 14 mg/L). A level element with indicating transmitter and a high-high float switch will also be provided in the tank. The tank will have a baffle wall before the discharge outlet to prevent short-circuiting. Design criteria for post aeration system are presented in Table 7-11.

Table 7-11. Post Aeration System Info

Number of Aeration Tank:	1
Hydraulic Retention Time:	30 min at peak hourly flow rate
Tank Volume:	29,200 gallon
Tank Dimension:	20 x 20 x 10 (LxWxH), ft
Type:	Fixed Floor PVC Flexible Membrane, Fine Bubble Diffusers, Tapered Arrangement, Nominal 9-in. Diameter.
Design Air Flow:	585 scfm
Control:	One Motor Operated Butterfly Valve for drop leg, Open/Close service
Number of Blowers:	2 (1 operating, 1 standby)
Location:	Process Control Building
Type:	Rotary Lobe Positive Displacement

7.2.5 Ultraviolet Disinfection

The post aeration effluent will be pumped to the ultraviolet (UV) disinfection system prior to disposal. Two pumps will be provided of the same size (485 gpm each) and have capacities such that with one unit out of service the remaining unit will handle the design average flow and two pumps can handle the peak hourly flow.

The UV disinfection system consists of one (1) 17 ft length x 24.5 inch width x 72 inch depth channel, with two (2) UV modules. The two (1 duty + 1 standby) modules are mounted in series for disinfection reliability and to ensure uninterrupted service during cleaning and other required maintenance. An array for 40 lamps are provided in each module, designed to provide a minimum dose at peak hourly flow no less than 30,000 µW-s/cm^2.The lamps are 165-watt low pressure, high intensity type and have a 13,000 hour warranty and are driven by electronic ballasts.

Any UV system gradually accumulates a coating on the quartz sleeves housing the lamps. This routine fouling must be removed periodically. The UV system will have an in-channel cleaning system which reduces maintenance. The automatic wiping system is to be operated once daily and the wipers are to be replaced once every two years.

The design criteria for the UV Disinfection System are presented in Table 7-12 and are based on 10 States requirements. The UV equipment cut sheet is included in Appendix C.

Table 7-12. UV Disinfection System Info

Peak Design Flow:	37,125 GPH
Performance:	< 200 CFU/100 mL (30 days geo mean) < 400 CFU/100 mL (7 days geo mean)
Number of Units:	2 (1 duty, 1 installed standby), in series
Number of Lamps	80 (40 per module)
Minimum UV Dose:	30,000 µW-s/cm^2
Ultraviolet Transmittance:	65% UVT (minimum)
Vendor Basis of Design:	Ozonia, Aquaray® 40 HO Vertical Lamp System

7.2.6 Aerated Sludge Holding Tank

Sludge wasted from the MBR tanks is pumped to the 46,200-gallon Aerated Sludge Holding Tank (23’ Diameter x 15’ D). The tank is designed to provide 3 days of hydraulic retention time at maximum month sludge production rate with an air supply of 40 scfm per 1000 cf sludge as specified in Wastewater Engineering, Metcalf & Eddy, 2004. The fixed diffused aeration system will provide 250 scfm air to keep the sludge fresh prior to the stream discharge. The sludge holding tank will be provided with fine bubble aeration grids designed to deliver the required range of air rates. Air will be provided by means of a positive displacement (PD) blower system (1 duty + 1 standby). The blowers will be

located in the Process Control Building and provided with piping to the tank. The design criteria for the sludge holding tank are presented in Table 7-13.

Table 7-13. Aerated Sludge Holding Tank Info

Number of Aeration Tank:	1
Hydraulic Retention Time:	3 days at maximum month sludge production rate
Tank Volume:	46,200 gallon
Tank Depth:	15 ft
Tank Diameter:	23 ft
Type:	Fixed Floor PVC Flexible Membrane, Fine Bubble Diffusers, Tapered Arrangement, Nominal 9-in. Diameter.
Design Air Flow:	250 scfm
Control:	One Motor Operated Butterfly Valve for drop leg, Open/Close service
Number of Blowers:	2 (1 operating, 1 standby)
Location:	Process Control Building
Type:	Rotary Lobe Positive Displacement

7.2.7 Belt Filter Press

Two (2) 1-HP flooded suction sludge pumps each rated at 50 gpm and 30' TDH then pump the sludge from the aerated sludge holding tank to the belt filter press for dewatering prior to disposal. The Belt Filter Press will be located in the Sludge Handling Building. Dewatering of sludge in a belt filter press can be viewed as taking place in two cycles: draining and a squeeze cycle. The belt filter press consists of two converging belts mounted on rollers. The lower belt is made of fine wire mesh and is porous.

As the sludge is moved along the belt, the entrained water is drained in the gravity drain zone. The sludge then passes through the press zone where converging belts and rollers provide high pressure for dewatering. A belt tensioning and alignment system automatically adjusts to variations in sludge feed for consistent output. The effective width of the belt is 0.6-meter. A variable incline discharge ramp allows for a very high dry cake solids output. The filter cake will fall into a sludge roll-off container located under the press for removal. One wash water pump will be included to clean the belts. The spray-wash system will be automatic.

The Sludge Handling Building will also include two (2) 125- gallon polymer day tanks. One (1) liquid polymer dilution system will be provided to inject polymer to the sludge on the suction side of the belt filter press feed pumps. The feed system will allow for the proper polymer concentration by varying water flow and neat polymer flow. The feed system is complete with mixing systems, metering pump, check valve, rotameter, pressure gauges and will be bolted to the equipment skid.

A flow metering device will be provided on the filtrate discharge piping. When the filtrate discharge decreases to a preselected rate, an alarm will indicate the completion of the filter cycle or the press could be operated by a timer based either on operator experience or on a target pressure. The filtrate will be pumped to the head of the MBR by one stainless steel, centrifugal pump. The design criteria for the sludge press are presented in Table 7-14. An equipment cut sheet is included in Appendix C.

Table 7-14. Sludge Filter Press Info

Number of Filter Press:	1
Type:	Belt Filter Press
Capacity:	50 gpm, 30 psi (max pressure differential)
Size:	0.6 meter effective belt width
Power Requirements:	1.5 HP Belt Drive Unit, 1 HP Hydraulic Unit
Wash water:	18 gpm at minimum 85 psi
Material:	Skid mounted on galvanized carbon steel skid
Polymer Consumption:	10 lbs active polymer/dry ton of sludge
Polymer Storage:	Two (2) 125-gallon tanks for one day storage each
Vendor Basis of Design:	Ashbrook Klampress KP05

7.2.8 Effluent Disposal

The WWTP effluent will be discharged through underground piping to the un-named Class C tributary to Satterly Stream located on the development site, as described in Section 3.1. The outfall will be an exposed, free-flow outlet on the side of the tributary.

7.2.9 Odor Control

An odor control system will be provided for the Aerated Sludge Holding Tank and Sludge Handling Building. A carbon based system has been selected for this function. The system will consist of a carbon unit, grease filter/mist eliminator, demister, volume damper, collection ductwork, and exhaust fan. The fan operation will be manual and will operate on an as needed basis. The odor control system will exhaust treated foul air from the Sludge Handling Building and the vents of the dewatering unit, as required.

7.2.10 Process Control Building

The Process Control Building will consist of the following:

- Permeate Pumps
- UV Disinfection Reactors
- Mixed Liquor Recycle Pumps
- Aeration Blowers

- Scour Blowers
- Post Aeration Blowers
- Sludge Holding Tank Blowers Membrane System Compressor and Dryer System
- Membrane Cleaning System
- MCC & PLC
- Laboratory
- Office
- Rest Room

7.2.11 Sludge Handling Building

The Sludge Handling Building will be provided for the sludge handling equipment (belt filter press and polymer feed system) and odor control system.

7.3 Hydraulic Analysis

A schematic of the proposed treatment system hydraulic profile is included in Appendix A – Conceptual Design Plans.

The WWTP influent will flow by gravity through a collection pipe from the development. The influent headworks effluent flows through fine screens, and then enters a wet well by gravity. Pumps will be installed to pump the wet well to the MBR system. Permeate of the MBR system will be pumped to the post-aeration tank. Post-aeration effluent will be pumped to the UV disinfection units and the UV effluent will be discharged by gravity to the un-named Class C tributary to Satterly Creek located next to the WWTP site.

Pipe systems will be designed to accommodate manufacturer's recommended velocities for the specific pipe material, generally below 5 ft/s for plastic pipe such as PVC. Gravity pipes will be designed per 10 States Standards to provide a minimum velocity of 2 ft/s when flowing full.

7.4 Residual Handling

Waste streams generated in the new treatment system will include:

- Reject waste from Influent Headworks
- Reject waste from Fine Screens
- Wasted Activated Sludge from MBR

The waste streams will be directed to the aerated sludge solids holding tank and will be directed to solids handling facilities to dewater and thicken. Residual solids will be hauled away off site.

7.5 Control Strategy

The new treatment facilities will be designed to operate automatically and generate alarms in the event of equipment failures. The system will be controlled by a SCADA system, allowing for the process to be monitored and controlled in the Process Control Building. The SCADA system will have a dial out function to alert the operator of alarms.

7.6 Chemical Addition, Storage and Containment

The sodium hydroxide, citric acid and sodium hypochlorite systems will be designed to meet the requirements of 6 NYCRR Parts 595-599 for storage and handling of hazardous substances. The coagulant (alum) and sludge thickening polymer will be stored in tanks on a containment pallet that provides 110% containment. Refer to Section 7.2 for sizing of each chemical storage unit.

7.7 Electrical Requirements and Emergency Power

Emergency power is required for the proposed treatment facilities. A back-up generator will be required in the event of a power failure to treat and discharge the wastewater from the Clovewood Development.

7.8 Operator and Laboratory Requirements

The operator will be responsible for monitoring plant performance, supervising chemical delivery, performing routine preventative maintenance, repairing equipment, and reviewing operational data to ensure compliance with the SPDES permit. The operator must be aware of the special health and safety requirements associated with the chemicals used in the treatment process.

All sample analysis will be performed by a certified analytical laboratory. Samples will be collected by the laboratory staff following the required protocols.

7.9 Cost Estimate

Equipment suppliers were contacted to develop preliminary sizing, list of major equipment and equipment costs in October 2015 and February 2018 based on the design basis established above. Equipment quotes and catalog information from the suppliers contacted are provided in Appendix C. 2015 installed costs and construction costs were escalated to March 2018 costs by using the ENR Construction Cost Indices (October 2015 – 10128 and March 2018 – 10958) then further developed based on percentage factor allowances plus experience on other projects. Table 7-15 presents the conceptual level cost estimate for the proposed WWTP. Table 7-15 shows the itemized capital costs for the WWTP at $6.92 million and annual O&M costs estimated at $460,000/year.

Conceptual level capital costs were developed as follows:

- Obtain equipment quotes for each of the major treatment processes.

- Total equipment costs were developed first and shown in the tables.
- Installation was estimated at 20% of equipment costs based on historic data experienced by HDR and industry standards for typical plants of similar size and complexity.
- Non-component costs including: electrical, piping, instrumentation and controls (I&C), coatings, and civil site work were estimated based on factors or percentages of equipment costs. These factors account for standard installation commodities, accessories, steal supports and standard testing support.
- Building costs were estimated based on similar, local projects.
- Indirect costs were estimated based on the percentages and allowances shown.
- Prime contractor mobilization/demobilization includes site trailer, site support equipment, power drop and utility connections for the temporary system.
- Contract overhead accounts for the following:
    - Part time – Project management support, project controls, procurement, quality and safety support.
    - Full time – Site construction manager (CM), site administration, standard CM travel pack.
- Escalation estimate assumed 24 month construction schedule starting in 2016. Compounding escalation was per RS Means at 5.28%.
- A contingency of 10% is included for the remaining equipment items and non-component costs.

Table 7-15. Updated Conceptual Cost Estimate for Clovewood WWTP

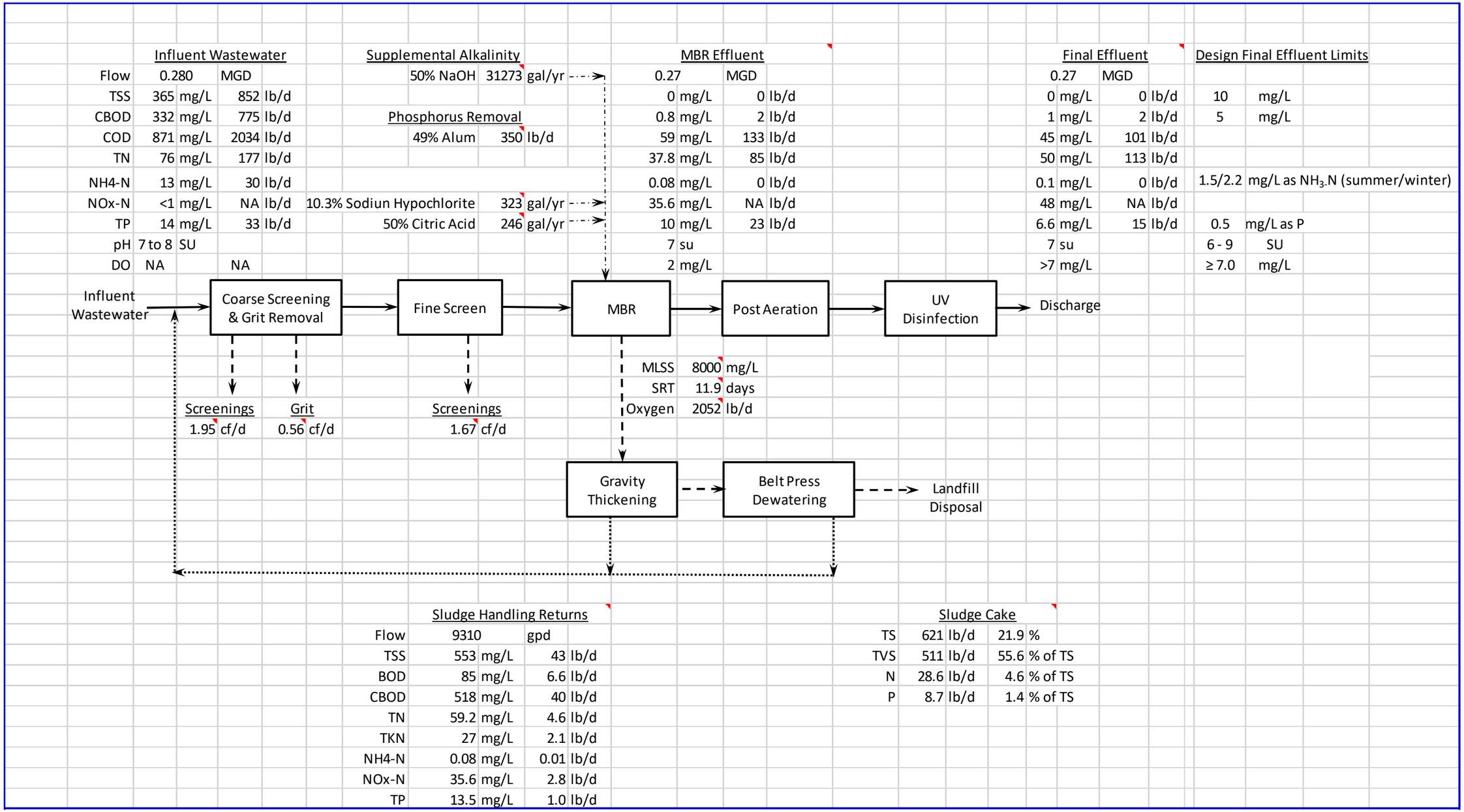
Item	Unit	Unit Price	Quantity	Cost ($)	Notes
(1) EQUIPMENT COSTS					
Headworks (Mechanical Screen / Grit Removal)	LS	$ 209,249	1	$ 209,249	1+1 configuration; WesTech CleanFlo All-in-one System + bagger assembly
PD Blower (Grit Tank Diffusers)	LS	$ 12,875	1	$ 12,875	Includes blower cover; per WesTech proposal
Lift Stations	LS	$ 59,507	2	$ 119,015	At Wetwell &Post Aeration; Pentair - Duplex LS (pumps, acessories and controls)
Fine Screens (2)	LS	$ 252,000	1	$ 252,000	Price include two fine screens; Huber 2mm Tank mounted screens u/s MBR
MBR System	LS	$ 1,011,000	1	$ 1,011,000	Z-MOD Packaged System; rev quote February 2018
Tankage for MBR System	LS	$ 360,000	1	$ 360,000	Allowance; $1.5/gallon
Aerated Sludge Holding Tank/Blower/Diffusers	LS	$ 81,146	1	$ 81,146	Estimated - 3 days WAS storage, max month production
Sludge Dewatering w Polymer Feed System	LS	$ 221,800	1	$ 221,800	Ashbrook KlamPress Quote 9/25/2015; Skid includes sludge pump & polymer feed
UV Disinfection	LS	$ 150,000	1	$ 150,000	Ozonia - Aquaray 40HO Vertical Lamp February 2018
Post Aeration Tank/Blower/ Diffusers	LS	$ 54,098	1	$ 54,098	Allowance
(1) Subtotal Equipment Costs				$ 2,471,200	
(2) INSTALLATION	%	20		$ 494,240	
(2) Subtotal Installed Equipment Costs				$ 2,965,440	
(3) NON-COMPONENT COSTS					
Electrical (percentage of 2)	%	10		$ 296,544	
Piping (percentage of 2)	%	7		$ 207,581	
Instrumentation and Controls (percentage of 2)	%	10		$ 296,544	
Coatings	LS	$ 25,000	1	$ 25,000	
Building/Structures					
MBR Building	SF	$75/SF	5000	$ 375,000	Allowance; includes HVAC (local pricing per CPC)
Sludge Handling Building w/ Odor Control	SF	$75/SF	900	$ 67,500	Allowance; includes HVAC and odor control (local pricing per CPC)
Civil Work - Site Preparation	LS	$ 50,000	1	$ 50,000	Allowance
(3) Subtotal Non-Component Costs				$ 1,318,200	
(4) INDIRECT COSTS					
Freight	LS			$ 10,000	Freight incl in equipment cost / Allowance for bulk commodities
Permits	LS			$ 50,000	Allowance for DEC and DOH review
Start-Up	LS			$ 100,000	Allowance
DSDC/construction management (percentage of 2+3)	%	3		$ 128,509	Allowance
Engineering Design (percentage of 2+3)	%	10		$ 428,364	Allowance
Prime Contractor Mobilization / Demob	%	3		$ 128,509	Allowance
Contractor Overhead (percentage of 2+3)	%	7		$ 299,855	Allowance
(4) Subtotal Indirect Costs				$ 1,145,200	
(5) Subtotal Capital Costs (2+3+4)				$ 5,428,800	
Escalation - Assume 24mo schedule start in 2018 (5.28%)	%	5.28		$ 286,641	
Construction Contingency (percentage of the sum of 5+escalation)	%	10		$ 571,544	
Contractor Fee @ 10% (percentage of the sum of 5 + escalation + contingency)	%	10		$ 628,698	
(6) TOTAL CAPITAL COSTS				$ 6,915,683	
(7) ANNUAL OPERATION AND MAINTENANCE COSTS					
Power	kwh/yr	$0.09	782,353	$ 70,412	Estimated based on Total HP
Labor	LS			$ 205,920	Allowance: 2 full time at $30/hr +Burdens
Chemicals	LS			$ 10,430	Allowance (NaOCl, Citric Acid, Alum for P-removal, polymer) + Freight
Maintenance	(2% of installed)			$ 85,672.80	TIC of project materials and labor
Membrane Replacement	LS			$ 20,000	Allowance - Assumes end membrane
UV Lamp Replacement	LS			$ 2,000	conservative: 80 lamps (13000 hr warranty) at $25/lamp
Sludge Off-site disposal	LS			$ 20,000	*TBD* - Include Allowance for 15 - 20% solids after BFP
Routine monitoring (for permit)	LS			$ 5,000	Allowance
(5) Subtotal Annual O&M Costs				$ 419,435	
O&M Contingency	%	10		$ 41,943	
(8) TOTAL ANNUAL O&M COSTS				$ 460,000	

8 Final Effluent Characteristics

8.1 Mass Balance Summary

Based on literature information provided from vendors and a WWTP simulation using EnviroSim BioWin the estimated removal rates and residuals production through the proposed WWTP were calculated and effluent quality was estimated. Figure 8-1 presents a mass balance for the proposed wastewater treatment processes based on the average design flow.

Figure 8-1. Estimated Final Effluent Mass Balance based on Average Design Flow



9 Operations and Maintenance Manual & Wet Weather Operating Plan

An Operations and Maintenance (O&M) Manual will be developed and submitted to NYSDEC before the final approval of the Engineering Report. The proposed Clovewood WWTP is not influenced by stormwater runoff or groundwater infiltration, and thus, the Wet Weather Operating Plan (WWOP) is not required.

10 Schedule of Construction

Construction of the new wastewater treatment plant will occur along with the construction of the Clovewood Development and is estimated to be completed by Spring 2018.

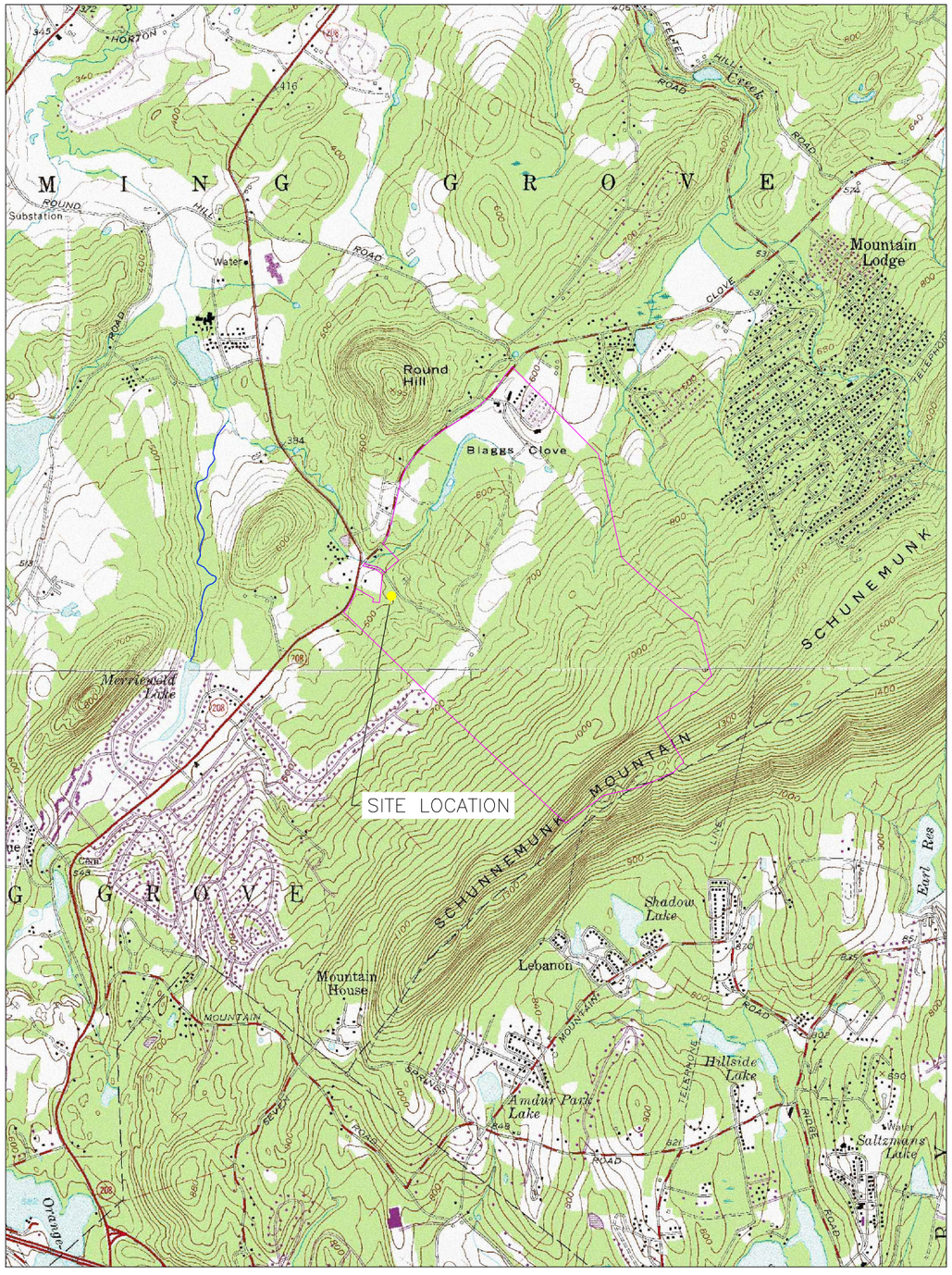
11 Final Inspection

A licensed CPC representative will be conducting the inspection and certifying to NYSDEC that the Clovewood WWTP has been fully completed in accordance with the approved engineering report, plans and specifications, SPDES permit, and letter of approval.

12 Closure Requirements

This section is not applicable as there is no disposal system closure involved in this new construction project.

Appendix A. Conceptual Design Plans



LOCATION MAP

NOT TO SCALE

CLOVEWOOD WASTEWATER TREATMENT PLANT

VILLAGE OF SOUTH BLOOMING GROVE, ORANGE COUNTY, NEW YORK

CONCEPTUAL DESIGN

Project No. 000000000244319

PERMITTING PLANS
OCTOBER 2015

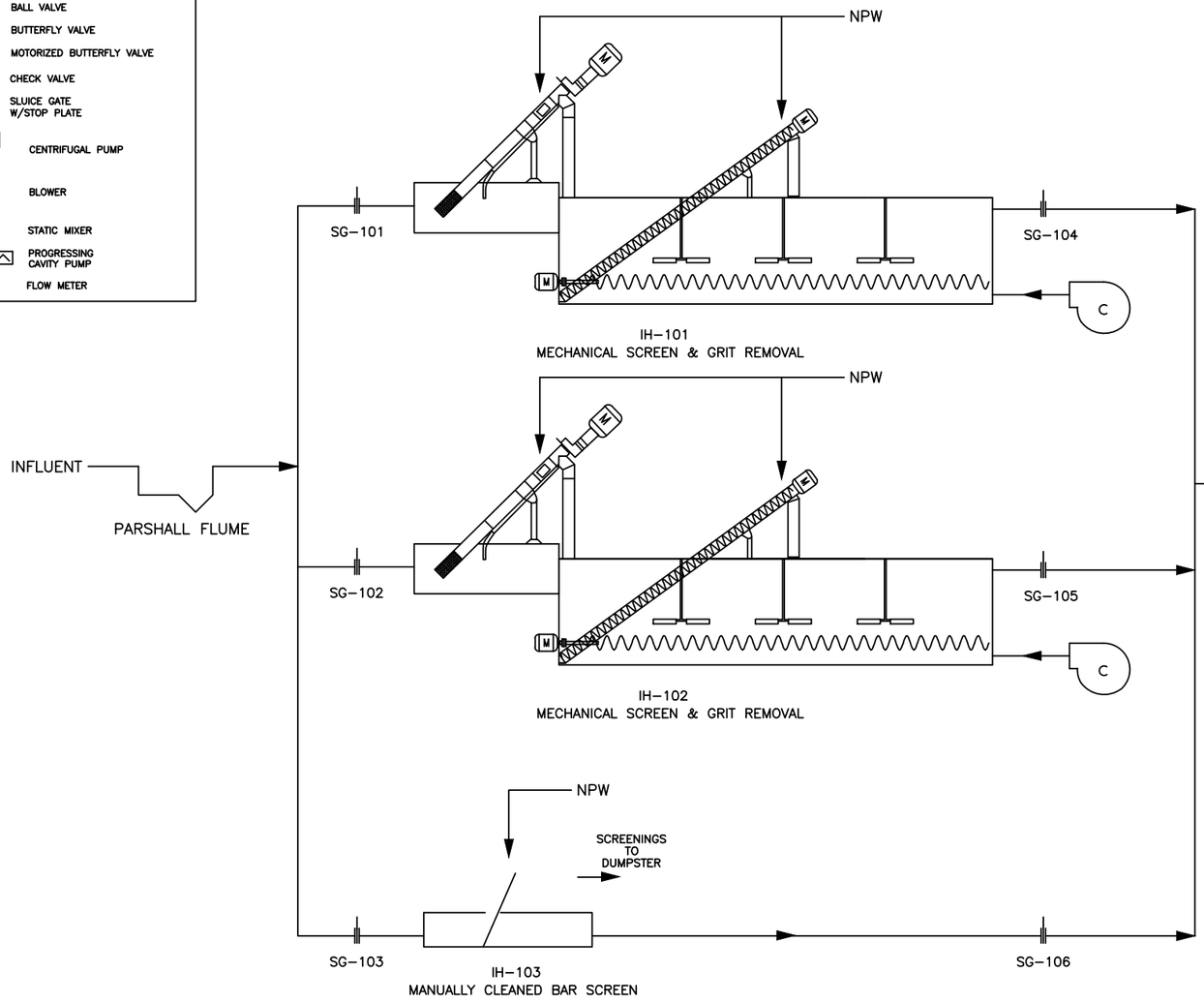
SHEET INDEX

LEGEND

- MAIN PROCESS LINE
- AIR/VAPOR PHASE
- SLUDGE/SOLIDS
- SUPERNATANT, FILTRATE
- 2-WAY SOLENOID
- BALL VALVE
- BUTTERFLY VALVE
- MOTORIZED BUTTERFLY VALVE
- CHECK VALVE
- SLUICE GATE W/STOP PLATE
- CENTRIFUGAL PUMP
- BLOWER
- STATIC MIXER
- PROGRESSING CAVITY PUMP
- FLOW METER

MECHANICALLY CLEANED INFLUENT HEADWORKS

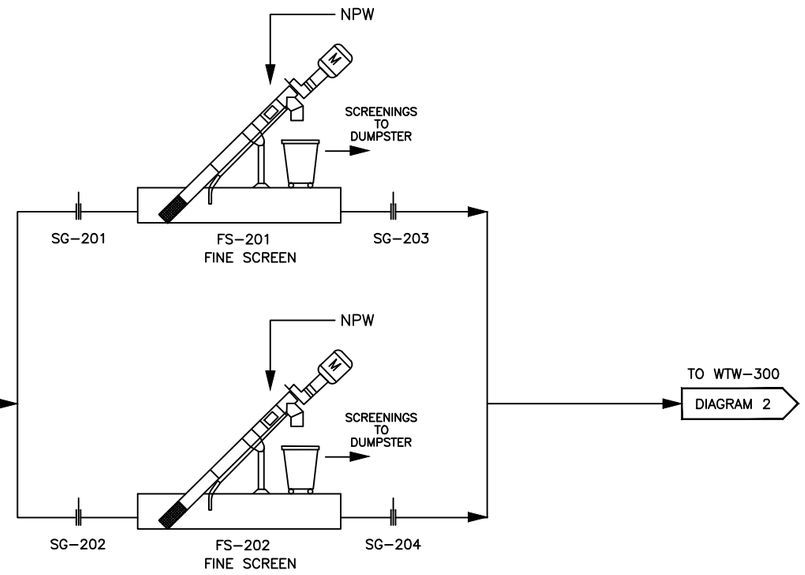
2 UNITS (1 DUTY)
1.4 MGD PEAK CAPACITY
6mm BAR SPACING



INFLUENT HEADWORKS
IH-100

FINE SCREENS

2 UNITS (1 DUTY)
1.4 MGD PEAK CAPACITY
2mm BAR SPACING



FINE SCREENS
FS-200

PRELIMINARY

PROJECT TITLE	CLOVEWOOD WASTEWATER TREATMENT PLANT
SHEET TITLE	**PROCESS FLOW DIAGRAM -1 (PRE-TREATMENT)**
PROJECT NUMBER	244319
PROJECT MANAGER	B. LEE
DATE	10/2/2015
REFERENCE SHEET	-
REFERENCE DOCUMENT	-
SHEET NUMBER	G-01

PUMP STATION
2 UNITS
485 GPM EACH

NAOH FEED SYSTEM

AERATION TANKS
2 UNITS
80,000 GALLON EACH
15' DEEP

DIFFUSED AERATION SYSTEM
9-IN. FINE BUBBLE DISC

AERATION BLOWERS
2 UNITS (1 PER TANK)
1 UNIT SHELF SPARE

ALUM FEED SYSTEM

SUPERNATANT FROM HT-800 & FILTRATE FROM BFP-900
DIAGRAM 5

FROM FS-200
DIAGRAM 1

WET WELL WTW-300

P-301

P-302

PUMP STATION
P-300

MOV-401

MOV-402

CP-402

CP-401

CAUSTIC TANK
CST-401

.09375

FROM MBR-500
DIAGRAM 3
RAS

B-401

CP-404

CP-403

ALUM TANK
CST-402

TO MBR-500
DIAGRAM 3

AERATION TANK
AT-401

B-402

TO MBR-500
DIAGRAM 3

AERATION TANK
AT-402

AERATION TANKS
AT-400

SUPPLIED BY MBR SYSTEM VENDOR

PRELIMINARY

LEGEND

- MAIN PROCESS LINE
- AIR/VAPOR PHASE
- SLUDGE/SOLIDS
- SUPERNATANT, FILTRATE
- 2-WAY SOLENOID
- BALL VALVE
- BUTTERFLY VALVE
- MOTORIZED BUTTERFLY VALVE
- CHECK VALVE
- SLUICE GATE W/STOP PLATE
- CENTRIFUGAL PUMP
- BLOWER
- STATIC MIXER
- PROGRESSING CAVITY PUMP
- FLOW METER

PROJECT TITLE
CLOVEWOOD
WASTEWATER TREATMENT PLANT

SHEET TITLE
PROCESS FLOW DIAGRAM -2
(BIOLOGICAL TREATMENT)

PROJECT NUMBER
244319

PROJECT MANAGER
B. LEE

DATE
10/2/2015

REFERENCE SHEET
-

REFERENCE DOCUMENT
-

SHEET NUMBER
G-02

RECYCLE PUMPS
2 UNITS (1 PER TANK)
1 UNIT SHELF SPARE

MBR TANKS
2 UNITS
13,150 GALLON, EACH
15' DEEP

SCOUR BLOWERS
2 UNITS (1 PER TANK)
SHARED SPARE
W/AERATION BLOWER

PERMEATE PUMPS
2 UNITS (1 PER TANK)
1 UNIT SHELF SPARE
PROVIDES BACKPULSE

CITRIC ACID FEED SYSTEM
CIP

SODIUM HYPOCHLORITE FEED SYSTEM
CIP

FROM AT-400
DIAGRAM 2

MOV-501

B-501

POTABLE WATER

POTABLE WATER

CP-502

CITRIC ACID

SODIUM HYPOCHLORITE

CST-501

CST-502

MOV-503

P-503

RAS/WAS P-501

MBR-501

PERMEATE/BACKPULSE TO/FROM PAT-600
DIAGRAM 4

FROM AT-400
DIAGRAM 2

MOV-502

B-502

POTABLE WATER

TO AT-400
DIAGRAM 2

RAS

MOV-505

MOV-506

MOV-504

P-504

RAS/WAS P-502

MBR-502

MEMBRANE BIOREACTOR
MBR-500

SUPPLIED BY MBR SYSTEM VENDOR

TO HT-800
DIAGRAM 5

WAS

LEGEND

- MAIN PROCESS LINE
- AIR/VAPOR PHASE
- SLUDGE/SOLIDS
- SUPERNATANT, FILTRATE
- 2-WAY SOLENOID
- BALL VALVE
- BUTTERFLY VALVE
- MOTORIZED BUTTERFLY VALVE
- CHECK VALVE
- SLUICE GATE W/STOP PLATE
- CENTRIFUGAL PUMP
- BLOWER
- STATIC MIXER
- PROGRESSING CAVITY PUMP
- FLOW METER

PRELIMINARY

PROJECT TITLE
CLOVEWOOD
WASTEWATER TREATMENT PLANT

SHEET TITLE
PROCESS FLOW DIAGRAM -3
(BIOLOGICAL TREATMENT)

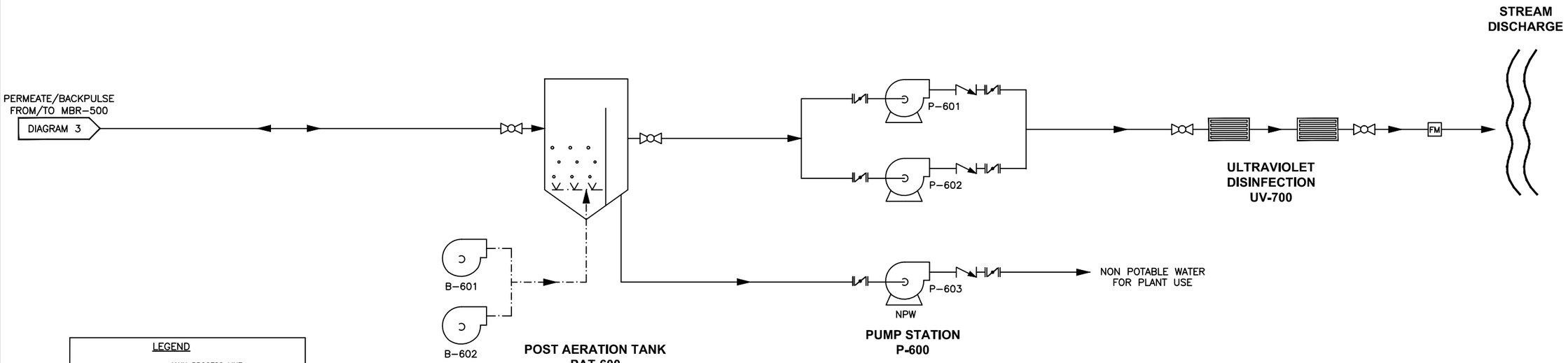
PROJECT NUMBER	244319
PROJECT MANAGER	B. LEE
DATE	10/2/2015
REFERENCE SHEET	-
REFERENCE DOCUMENT	-
SHEET NUMBER	G-03

POST AERATION TANK
1 UNIT @ 29,200 GALLON
585 SCFM AIR
2 BLOWERS (1 DUTY)

PUMP STATION
2 UNITS
485 GPM, EACH

NPW PUMP
1 UNIT
FLOW TBD

UV DISINFECTION
2 MODULES (1 DUTY)
40 LAMPS PER MODULE
CHANNEL: 17' L x 24.5" W x 72" D



LEGEND

- MAIN PROCESS LINE
- AIR/VAPOR PHASE
- SLUDGE/SOLIDS
- SUPERNATANT, FILTRATE
- 2-WAY SOLENOID
- BALL VALVE
- BUTTERFLY VALVE
- MOTORIZED BUTTERFLY VALVE
- CHECK VALVE
- SLUICE GATE W/STOP PLATE
- CENTRIFUGAL PUMP
- BLOWER
- STATIC MIXER
- PROGRESSING CAVITY PUMP
- FLOW METER

PRELIMINARY

PROJECT TITLE: CLOVEWOOD WASTEWATER TREATMENT PLANT

SHEET TITLE: **PROCESS FLOW DIAGRAM -4 (POST TREATMENT)**

PROJECT NUMBER: 244319
PROJECT MANAGER: B. LEE
DATE: 10/2/2015

REFERENCE SHEET: -
REFERENCE DOCUMENT: -
SHEET NUMBER: G-04

AERATED SLUDGE HOLDING TANK
1 UNIT @ 46,200 GALLONS
23'-0"ø x 15'-0" D

DIFFUSED AERATION SYSTEM
2 UNITS (1 DUTY)
250 SCFM AIR, EACH

SLUDGE PUMPS
2 UNITS
50 GPM, 30 FT TDH

ROTARY DRUM THICKENER
1 UNIT
60 GPM, 300 LBS/HR
@ 1% SOLIDS

POLYMER FEED SYSTEM

BELT FILTER PRESS
125 GPM
1-0 METER BELT WIDTH

LEGEND
- MAIN PROCESS LINE
- AIR/VAPOR PHASE
- SLUDGE/SOLIDS
- SUPERNATANT, FILTRATE
- 2-WAY SOLENOID
- BALL VALVE
- BUTTERFLY VALVE
- MOTORIZED BUTTERFLY VALVE
- CHECK VALVE
- SLUICE GATE W/STOP PLATE
- CENTRIFUGAL PUMP
- BLOWER
- STATIC MIXER
- PROGRESSING CAVITY PUMP
- FM FLOW METER

SUPERNATANT

TO WTW-300
DIAGRAM 2

POTABLE WATER

CP-901

POLYMER TANK
CST-901

SLUDGE DEWATERING
BELT FILTER PRESS
BFP-900

FILTRATE

FROM MBR-500
DIAGRAM 3

WAS

P-801
SLUDGE PUMP

P-802
SLUDGE PUMP

B-801

B-802

AERATED SLUDGE
HOLDING TANK
HT-800

SLUDGE CAKE TO LANDFILL

PRELIMINARY

HDR

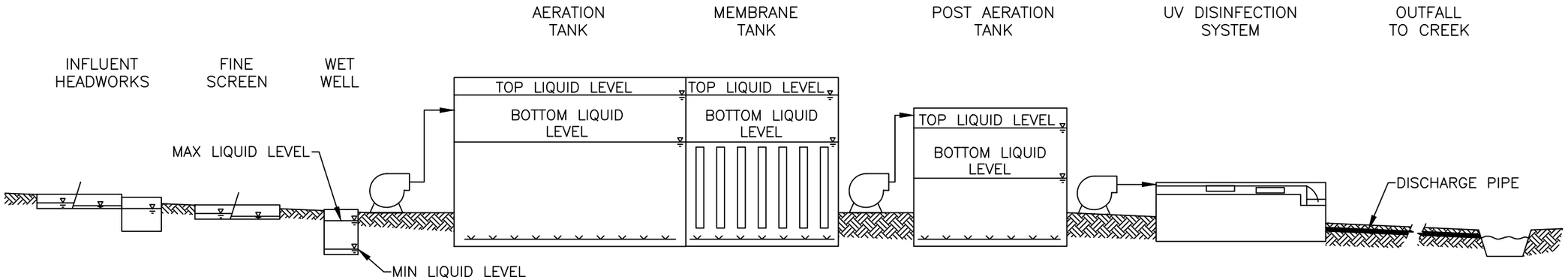
PROJECT TITLE CLOVEWOOD
WASTEWATER TREATMENT PLANT

SHEET TITLE
PROCESS FLOW DIAGRAM -5
(SLUDGE FLOW)

PROJECT NUMBER 244319
PROJECT MANAGER B. LEE
DATE 10/2/2015

REFERENCE SHEET -
REFERENCE DOCUMENT -
SHEET NUMBER G-05

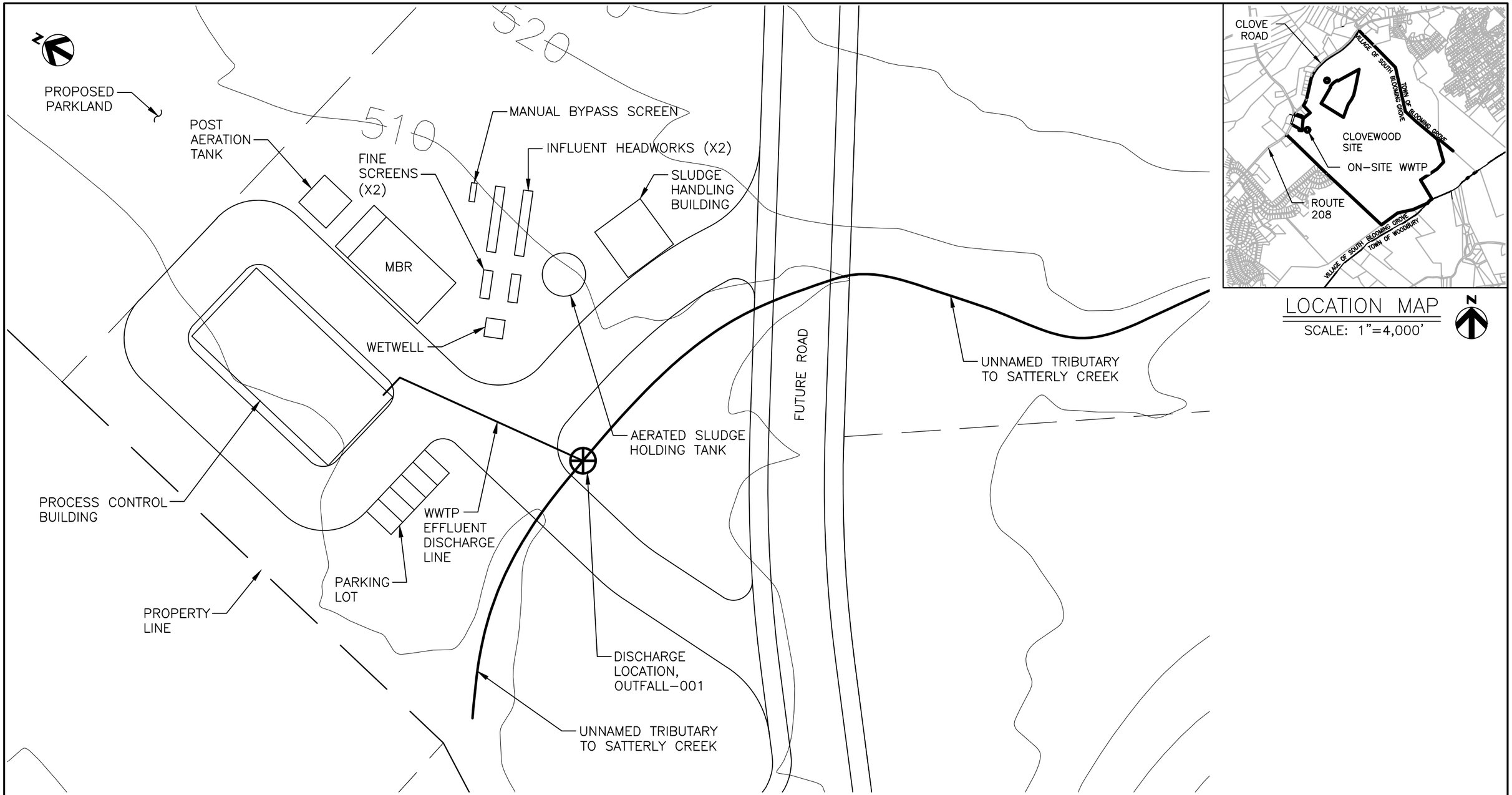
MBR



HYDRAULIC PROFILE
SCALE: NTS

PRELIMINARY

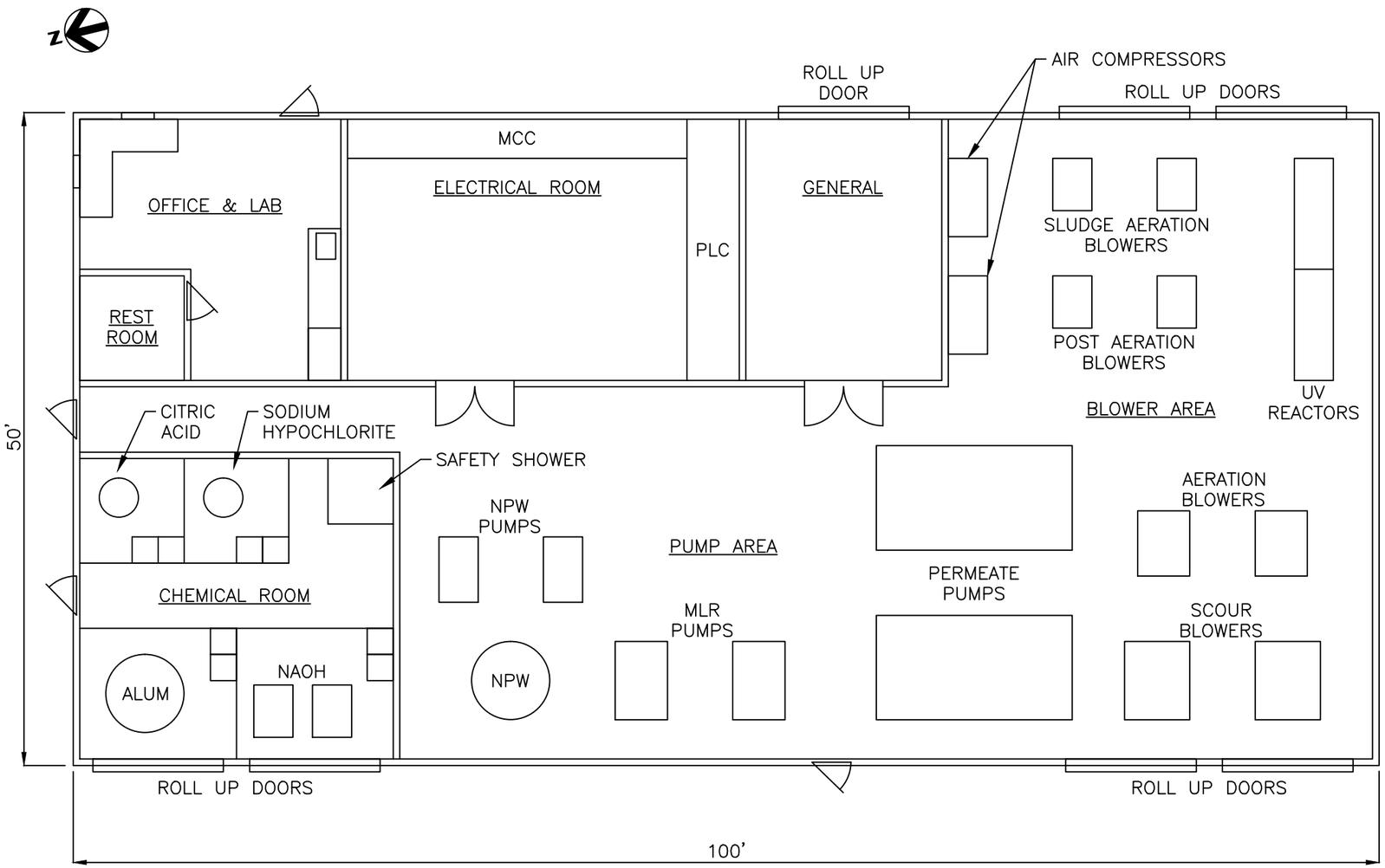
PROJECT TITLE: CLOVEWOOD WASTEWATER TREATMENT PLANT		PROJECT NUMBER: 244319	REFERENCE SHEET: -
SHEET TITLE: **WWTP HYDRAULIC PROFILE**		PROJECT MANAGER: B. LEE	REFERENCE DOCUMENT: -
		DATE: 9/25/2015	SHEET NUMBER: G-06



WWTP SITE PLAN
SCALE: 1"=50'

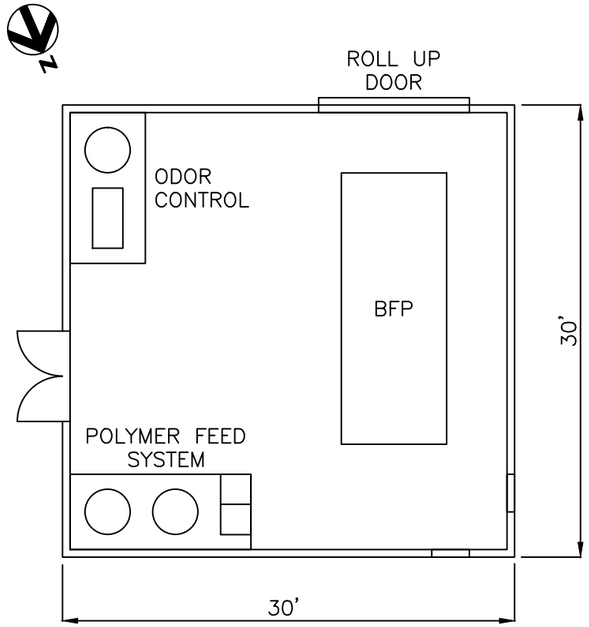
LOCATION MAP
SCALE: 1"=4,000'

PROJECT TITLE	CLOVEWOOD WASTEWATER TREATMENT PLANT
SHEET TITLE	**WWTP SITE PLAN**
PROJECT NUMBER	244319
PROJECT MANAGER	B. LEE
DATE	10/2/2015
REFERENCE SHEET	-
REFERENCE DOCUMENT	-
SHEET NUMBER	C-01



PROCESS CONTROL BUILDING

SCALE: 1"=10'



SLUDGE HANDLING BUILDING

SCALE: 1"=10'

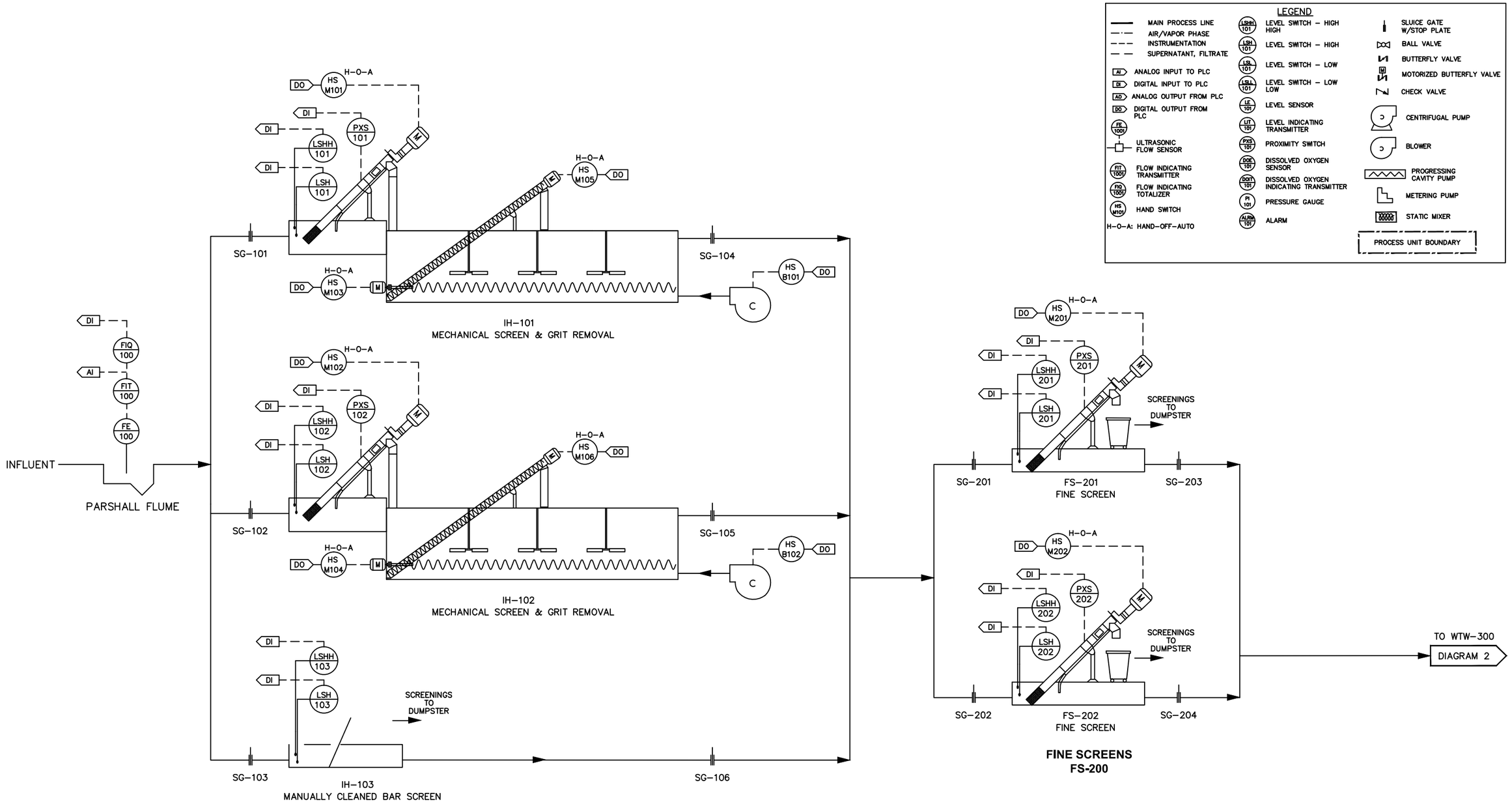
PRELIMINARY

10 0 10

SCALE IN FEET

PROJECT TITLE	CLOVEWOOD WASTEWATER TREATMENT PLANT
SHEET TITLE	**WWTP BUILDINGS LAYOUT**

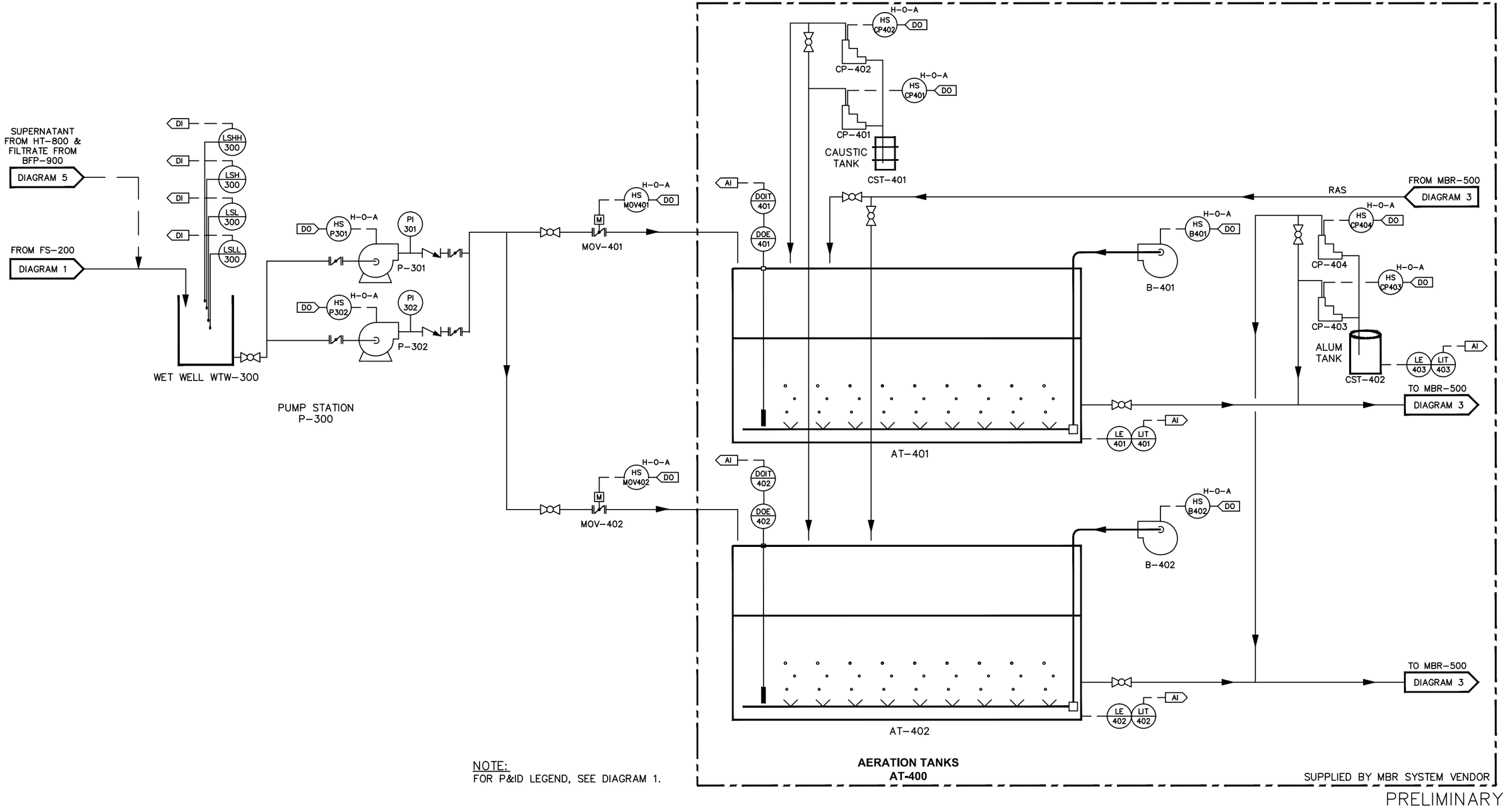
PROJECT NUMBER	244319
PROJECT MANAGER	B. LEE
DATE	10/2/2015
REFERENCE SHEET	-
REFERENCE DOCUMENT	-
SHEET NUMBER	M-01



PROJECT TITLE
CLOVEWOOD
WASTEWATER TREATMENT PLANT

SHEET TITLE
PROCESS & INSTRUMENTATION DIAGRAM -1 (PRE-TREATMENT)

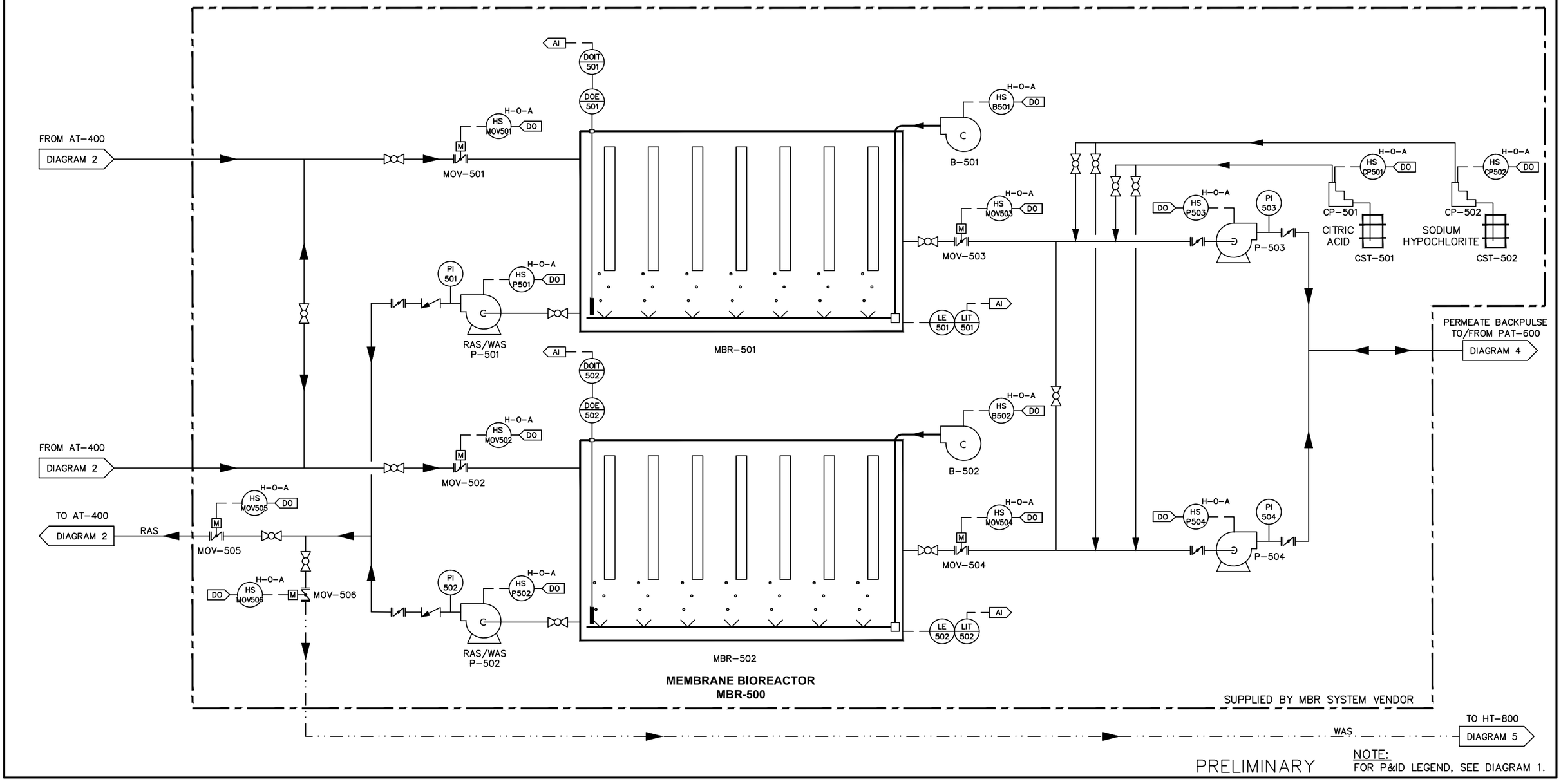
PROJECT NUMBER	244319
PROJECT MANAGER	B. LEE
DATE	10/2/2015
REFERENCE SHEET	-
REFERENCE DOCUMENT	-
SHEET NUMBER	Y-01



NOTE:
FOR P&ID LEGEND, SEE DIAGRAM 1.

PRELIMINARY

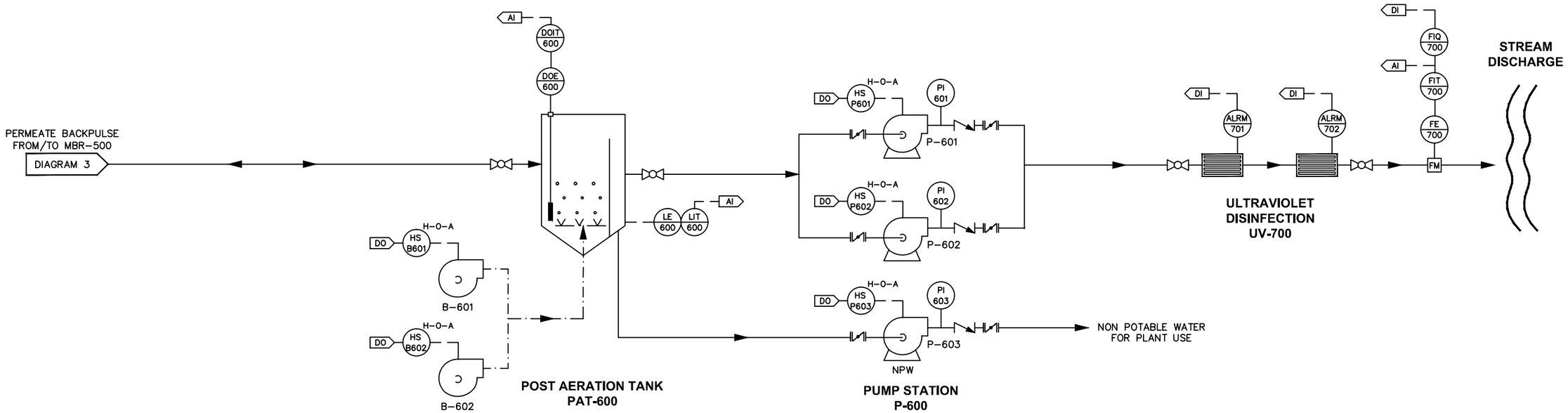
PROJECT TITLE	CLOVEWOOD WASTEWATER TREATMENT PLANT
SHEET TITLE	**PROCESS & INSTRUMENTATION DIAGRAM -2 (BIOLOGICAL TREATMENT)**
PROJECT NUMBER	244319
PROJECT MANAGER	B. LEE
DATE	10/2/2015
REFERENCE SHEET	-
REFERENCE DOCUMENT	-
SHEET NUMBER	Y-02



PRELIMINARY

NOTE:
FOR P&ID LEGEND, SEE DIAGRAM 1.

PROJECT TITLE: CLOVEWOOD WASTEWATER TREATMENT PLANT		PROJECT NUMBER: 244319	REFERENCE SHEET: -
SHEET TITLE: **PROCESS & INSTRUMENTATION DIAGRAM -3 (BIOLOGICAL TREATMENT)**		PROJECT MANAGER: B. LEE	REFERENCE DOCUMENT: -
		DATE: 10/2/2015	SHEET NUMBER: Y-03



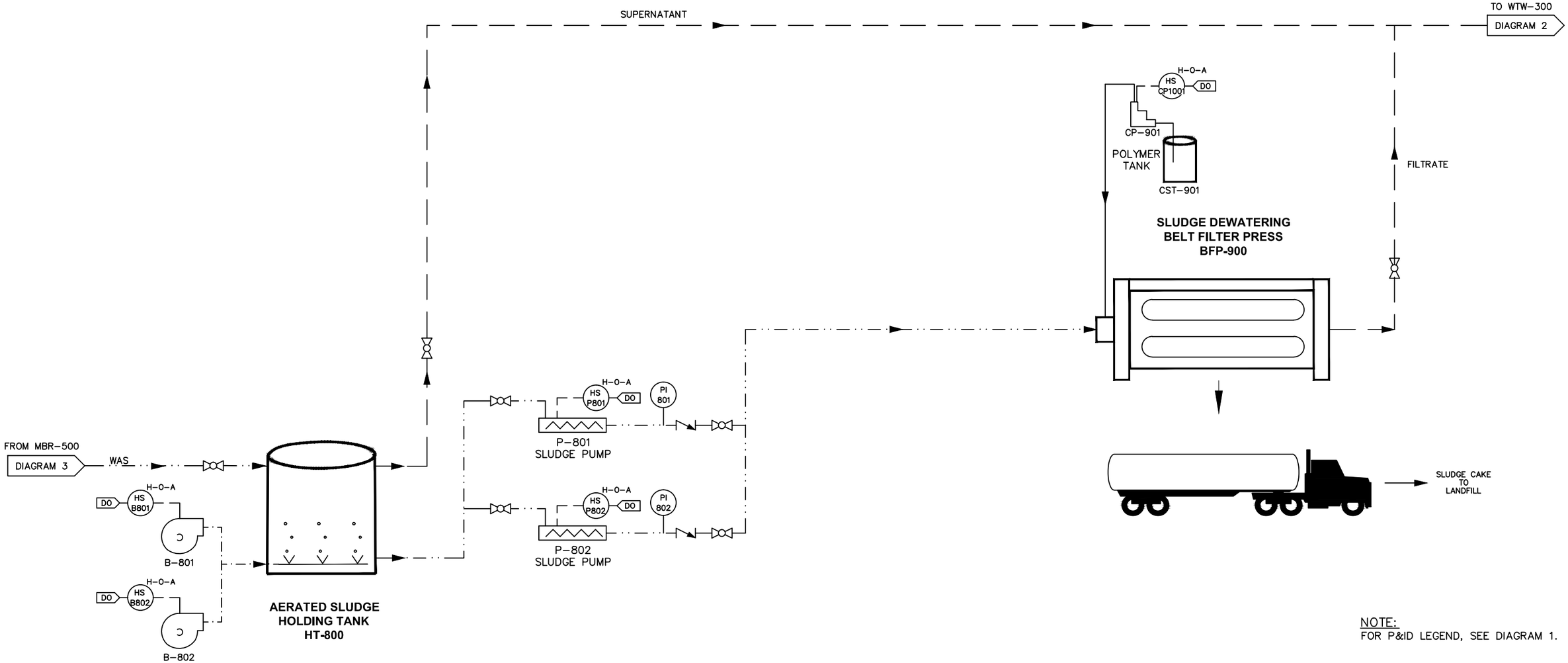
NOTE:
FOR P&ID LEGEND, SEE DIAGRAM 1.

PRELIMINARY

PROJECT TITLE
CLOVEWOOD
WASTEWATER TREATMENT PLANT

SHEET TITLE
PROCESS & INSTRUMENTATION DIAGRAM -4
(POST TREATMENT)

PROJECT NUMBER	244319
PROJECT MANAGER	B. LEE
DATE	10/2/2015
REFERENCE SHEET	-
REFERENCE DOCUMENT	-
SHEET NUMBER	Y-04



NOTE:
FOR P&ID LEGEND, SEE DIAGRAM 1.

PRELIMINARY

PROJECT TITLE
CLOVEWOOD
WASTEWATER TREATMENT PLANT

SHEET TITLE
PROCESS & INSTRUMENTATION DIAGRAM -5
(SLUDGE FLOW)

PROJECT NUMBER	244319
PROJECT MANAGER	B. LEE
DATE	10/2/2015
REFERENCE SHEET	-
REFERENCE DOCUMENT	-
SHEET NUMBER	Y-05

Appendix B. FEMA Flood Insurance Map

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 18. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NINGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography provided by the New York Sate Office of Cyber Security & Critical Infrastructure Coordination. This information was provided as 30-centimeter and 60-centimeter resolution natural color orthoimagery from photography dated April-May 2004.

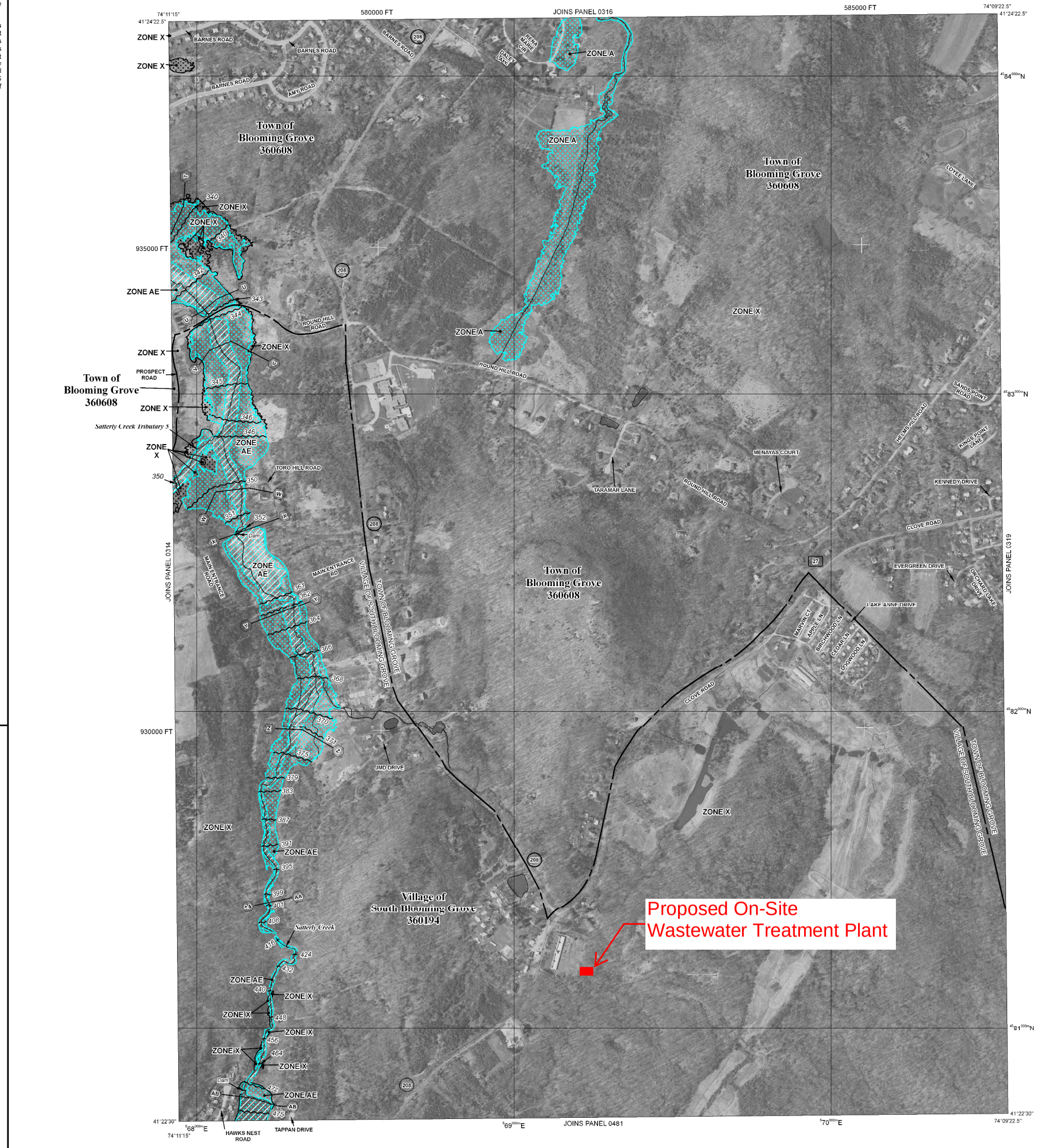
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); base flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
3 — 3	Limited detail cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4376000mN	1000-meter Universal Transverse Mercator grid values, zone 18N
600000 FT	5000-foot grid ticks: New York State Plane coordinate system, East zone (FIPSZONE 3101), Transverse Mercator projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
August 3, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0318E

FIRM

FLOOD INSURANCE RATE MAP

for ORANGE COUNTY, NEW YORK
(ALL JURISDICTIONS)

CONTAINS:

COMMUNITY	NUMBER
BLOOMING GROVE, TOWN OF	360608
SOUTH BLOOMING GROVE, VILLAGE OF	360194

PANEL 318 OF 630
MAP SUFFIX: E
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
36071C0318E

EFFECTIVE DATE
AUGUST 3, 2009

Federal Emergency Management Agency

Appendix C. Equipment Supplier Proposal and Cutsheets

APPENDIX C-1

WESTECH SCREENING & GRIT REMOVAL, 1/15/2015

WesTech
an employee-owned company

Proposal For:
Orange County, New York

Equipment:
CleanFlo™ All in One

Engineer:
HDR

Represented By:
GP Jager & Associates, Inc.
143 Miller Road
Kinnelon, NJ 07405
Contact: Bob Fenton
Phone: (973) 750-1180
Fax: (973) 750-1181
bfenton@jagerinc.com

Furnished By:
WesTech Engineering, Inc.
Salt Lake City, Utah 84115
Contact: Steve Rioux
Direct: 847.775.2410
Phone: 801.265.1000
Fax: 801.265.1080

WesTech Proposal: 1560020
Wednesday, January 14, 2015

ITEM: "A" - One (1) CleanFlo™ All in One Model TSF6-80

EACH UNIT FURNISHED COMPLETE BY WESTECH WITH THE FOLLOWING COMPONENTS:

BASIS OF DESIGN (EACH)

Application:	Domestic Sewage Screening and Grit Removal
Design Average Flow:	0.42 MGD
Max Daily Flow:	0.84 MGD
Peak Hour Flow:	1.4 MGD
Screen Opening:	6 mm (1/4 inch)
Opening Type:	Perforated
Grit Capture Rating at Max:	95% of grit >50 mesh in size 90% of grit 50-70 mesh in size 75% of grit 70-100 mesh in size
Grit Specific Gravity:	2.65
Grit Tank Air Requirement:	25-45 cfm @ 4.4 psi
Washwater Requirement:	8 gpm @ 30-40 psi
Influent Connection:	12 inch flanged
Effluent Connection:	12 inch flanged

COMBINED HEADWORKS SYSTEM (EACH)

- Integral screen tank from type 304 stainless steel including inlet connection. Tank includes mount for ultrasonic level sensor and vent connection. Hinged access door supplied with safety microswitch.
- Screenings basket from type 304 stainless steel.
- Screen conveyor tube with wear bars from type 304 stainless steel.
- Shaftless spiral screw from high strength alloy steel with protective primer coating and brushes attached in the basket area. Brushes are supplied in sections each covering 180° of the spiral and shall have nylon bristles molded into a plastic core and attached to the screw with stainless steel fasteners.
- Screen dual chambered dewatering and discharge zone from type 304 stainless steel with hinged access door and safety microswitch.
- Automatic screen dewatering zone drain flush spray system from type 304 stainless steel including manual control valve.
- Drain piping from screen compaction zone to direct pressate back into integral tank.
- Integral grit tank from type 304 stainless steel with effluent weir, flanged effluent connection and capped 3 inch drain. Removable bolted covers provide fully enclosed system and allow for operator access.

- Horizontal and inclined grit shaftless spiral screws from high strength alloy steel with protective primer coating.
- Grit tank aeration system with type 304 stainless steel coarse bubble diffusers and manual shutoff valve.
- Drive units with 1.5 HP screen motor, 3/4 HP horizontal grit conveyor motor, and 3/4 HP inclined grit conveyor motor suitable for 480/3/60 electrical supply.

HARDWARE (EACH)

- Assembly fasteners from type 304 stainless steel.
- Anchor rods from type 304 stainless steel.

CONTROLS AND ELECTRICAL DEVICES (EACH)

- One (1) NEMA 4X stainless steel main control panel suitable for 480/3/60 electrical supply. Control panel shall contain the following devices for operation of the unit:
    1. Step down control transformer and disconnect with handle.
    2. Branch circuit protection.
    3. Screen, horizontal and inclined grit drive motor starters.
    4. Emergency stop pushbutton.
    5. Screen HOA switch.
    6. Screen FOR switch, spring return Reverse to Off.
    7. Horizontal grit spiral, inclined grit spiral and compaction flush HOA switches.
    8. Load monitors for overload protection of each motor.
    9. Hour meter for each motor.
    10. Control power and run indicating lights.
    11. Alarm lights indicating overcurrent and starter overload.
    12. Alarm reset pushbutton.
    13. Programmable control relay for control logic functions.
    14. Run and alarm auxiliary contacts.

- One (1) NEMA 4X local Emergency Stop pushbutton for field mounting at the unit.
- Three (3) NEMA 4X safety microswitches mounted to the screen tank and screen dewatering/discharge access door.
- One (1) 2-way 120V brass body solenoid valve to control spray wash functions to the screen.
- One (1) Milltronics Pointek ULS200 ultrasonic level sensor.

SPARE PARTS (EACH)

- One (1) set of spare brushes.

FIELD SERVICE (TOTAL)

- One (1) trip and one (1) day for installation inspection, start up, and instruction of plant personnel.

CLARIFICATIONS/COMMENTS

- Unit anchorage designed around RedHead A7 adhesive system. Adhesive and applicator by others.

- Air supply to grit tank aeration is by others. Option for supply by WesTech is listed below.
- Due to size constraints, the unit will ship with some field assembly required. Typically breakdown consists of:
    1. Screen tank and grit tank. Fully assembled or shipped in 15-30' lengths. Flanges are provided at connection points for assembly.
    2. Screen and grit conveyor tube extension supports bolt to top of grit tank.
    3. Screen conveyor tube and spiral assembly must be mounted to screen tank.
    4. Grit conveyor tube and spiral assembly must be mounted to grit tank.
    5. Discharge chute extensions must be bolted to screen and grit discharge points.
    6. Adjustable foot pads mounted to tank and adjusted to level equipment.

OPTIONAL ITEMS:

- Item A-1: Blower – PD Blower package to provide air supply to grit tank diffusers. One per unit.
- Item A-2: Blower Cover – Fiberglass sound enclosure / cover supplied for installation over blower to reduce noise and protect blower from rain and snow accumulation. One per unit.
- Item A-3: Discharge Bagger - Continuous bagger assembly to collect material at screen and grit discharges with refillable bag cassettes.

NOTE: ANY ITEM NOT LISTED ABOVE TO BE FURNISHED BY OTHERS:

ITEMS NOT BY WESTECH: Electrical wiring, conduit or electrical equipment, piping, valves, or fittings, shimming material, lubricating oil or grease, shop or field painting, field welding, erection, detail shop fabrication drawings, performance testing, unloading, storage, concrete work, hoist or lifting apparatus, grating, platforms, stairs, handrailing, or field service (except as specifically noted).

This proposal section has been reviewed for accuracy and is approved for issue:
By: **Stephen Rioux** Date: January 14, 2015

WESTECH

BUDGET PRICING

ITEM	EQUIPMENT	PRICE (U.S.)
"A"	(1) CleanFlo™ All in One Model TSF6-80	$190,000
"A-1"	Blower	$8,500
"A-2"	Blower Cover	$3,400
"A-3"	Discharge Bagger	$3,400

The above mentioned equipment was designed according to the information which we received. The dimensions may vary slightly depending on the plant's actual design parameters. Assumed values may have been used, therefore, all information shall be verified by the Engineer.

Unless otherwise indicated, prices listed are for equipment only. All optional items will be offered with the purchase of the scoped equipment only. No optional items will be sold separately.

Prices are for a period not to exceed 30 days from date of proposal.

Warranty: A written supplier's warranty will be provided for the equipment specified in this section. The warranty will be for a minimum period of (1) year from start-up or 18 months from time of equipment shipment, whichever comes first. Such warranty will cover all defects or failures of materials or workmanship which occurs as the result of normal operation and service except for normal wear parts (i.e. squeegees, skimmer wipers, etc.).

Terms: Terms for equipment are 15 percent payment of the purchase price with submittal drawings, 35 percent upon release for fabrication, and 50 percent net **30 days** from shipment. Retentions are not allowed.

Sales Tax: No sales taxes, use taxes, or duties have been included in our pricing.

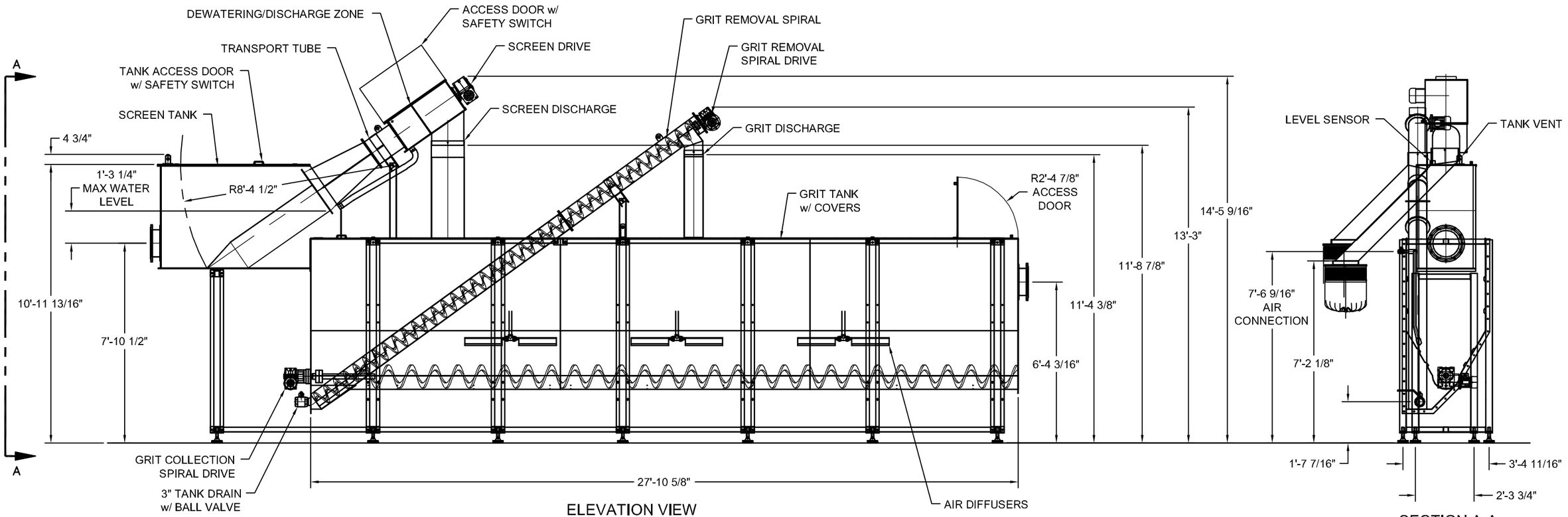
Freight: Prices quoted are **F.O.B. shipping point** with freight allowed to a readily accessible location nearest to jobsite. All claims for damage or loss in shipment shall be initiated by purchaser.

Submittals: Submittals will be made approximately **6 to 8 weeks** after purchase order is received in our office.

Shipment: Estimated shipment time is **18 to 20 weeks** after approved submittal drawings are received in our office.

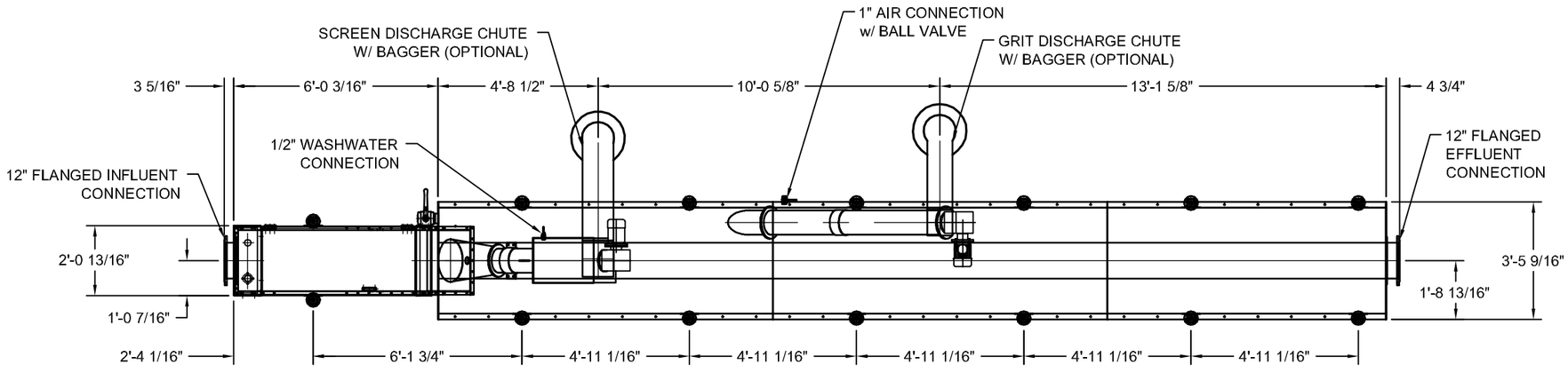
Field Service: Prices do not include field service unless noted in equipment description. Additional field service is available at $960.00 per day plus expenses.

Paint: If your equipment has paint included in the price, please take note of the following. Primer paints are designed to provide only a minimal protection from the time of application (usually for a period not to exceed 30 days). Therefore, it is imperative that the finish coat be applied within 30 days of shipment on all shop primed surfaces. Without the protection of the final coatings, primer degradation may occur after this period, which in turn may require renewed surface preparation and coating. If it is impractical or impossible to coat primed surfaces within the suggested time frame, WesTech strongly recommends the supply of bare metal, with surface preparation and coating performed in the field. All field surface preparation, field paint, touch-up and repair to shop painted surfaces are not by WesTech.



ELEVATION VIEW
SCALE: 1/4" =1'-0"

SECTION A-A
SCALE: 1/4" =1'-0"



PLAN VIEW
SCALE: 1/4" =1'-0"

BASIS OF DESIGN

APPLICATION:	DOMESTIC SEWAGE SCREENING AND GRIT REMOVAL
DESIGN AVERAGE FLOW:	0.42 MGD
MAX DAILY FLOW:	0.84 MGD
PEAK HOUR FLOW:	1.4 MGD
SCREEN OPENING:	6 MM (1/4 INCH)
OPENING TYPE:	PERFORATED
GRIT CAPTURE RATING AT MAX:	95% OF GRIT >50 MESH IN SIZE 90% OF GRIT 50-70 MESH IN SIZE 75% OF GRIT 70-100 MESH IN SIZE
GRIT SPECIFIC GRAVITY:	2.65
WASHWATER REQUIREMENTS:	8GPM @ 30-40 PSI
GRIT TANK AIR REQUIREMENTS:	25-45 CFM @ 4.4 PSI

NOTES:

1. MOTOR REQUIREMENTS: 480, 3PH, 60Hz
   SCREEN: 1.5 HP
   HORIZONTAL GRIT CONVEYOR: 3/4 HP
   INCLINE GRIT CONVEYOR: 3/4 HP
2. ALL INTERCONNECTING PIPING AND WIRING BY OTHERS (NOT BY WESTECH). PROVIDE FLEXIBLE CONNECTIONS TO THE UNIT IN ORDER TO ALLOW PIVOTING OF THE SCREEN.

REV	REVISION DESCRIPTION	ECN	DESIGNER	APPROVER	DATE

REFERENCE DOCUMENTS

STATUS: INFORMATION ONLY

PROJECT: 1560020
ORANGE COUNTY, NY

WESTECH

TITLE: **CLEANFLO ALL IN ONE**
TSF6-80

DESIGNER	CHECKER	APPROVER	DATE
BE14	ID	ID	2015/01/14

DOCUMENT NUMBER	SHEET	REV
1560020-1000	1 OF 1	-

APPENDIX C-2
HUBER FINE SCREENS, 1/2/2015

BUDGET PROPOSAL

Project Name: Orange County, NY

Equipment: RPPS/780/2

Date: January 31, 2018

Huber Contact:
Brian Baker
Regional Sales Manager - South
Brian.Baker@hhusa.net
704-840-3085

Represented by:
Joseph Polomene
Sherwood Logan & Associates
polomene.j@sherwoodlogan.com
(732) 877-8781

Huber Technology, Inc.
9735 NorthCross Center Court
Suite A
Huntersville, NC 28078

Phone: (704) 949-1010
Fax: (704) 949-1020

DESCRIPTION

HUBER ROTAMAT® RPPS Perforated Plate Screen
Peak Flow 0.559 MGD Wastewater Max TSS level of 563 mg/L
Pricing: $252,000
Including:

- Two (2) x RPPS/780/2
- Channel mounted design
- 304L Stainless Steel construction; pickled and passivated in acid bath
- Shafted screw with integrated maintenance free bearing
- 35º inclined auger tube
- 35º inclined screen basket; width: 31 inches (780 mm)
- Perforated plate opening: 0.08 in. (2 mm)
- Class 1 / Division 1, 2 HP motor, 480, 3 phase, 60 Hz, Inverter Duty motor, to be used with VFD control, SF 1.0
- Wall mounted or stand-alone NEMA 4X stainless steel control panel suitable for controlling equipment in a Class 1 Division 1 environment
- Integrated screenings washing system IRGA is included
- Two (2) solenoid valves for compaction zone and IRGA, 1-inch, 120 VAC, 2-way, brass body, Class 1 Division 1
- Manufacturer's Services: one (1) trip, three (3) service days for inspection, startup, testing, and training. Additional manufacturer's services are available on a per diem rate upon
- One (1) solenoid valve for the spraybar, 1-inch, 120VAC, 2-way, brass body, Class 1 Division 1
- Polyurethane seal to prevent screenings bypass

Frost Protection Adder: +$13,000/ Machine

Notes:

1. Detailed Equipment Specification, Drawing, and Formalized Proposal are available upon request.
2. If there are site-specific hydraulic constraints that must be applied, please consult Huber Technology's representative to ensure compatibility with the proposed system.
3. Budget estimate is based upon Huber Technology's Standard Design, Terms, & Conditions. Any deviation from these standards may result in a price adder.
4. Budget estimate is quoted in US$ unless otherwise stated.
5. All of Huber's standard machines and systems are manufactured from 304L stainless steel. Huber makes no representation or warranties concerning the service life of the equipment against such abrasion or corrosion. The concentration of chloride and hydrogen sulfide (H2S) in the equipment operating environment shall be kept below the following values:
   a. Chloride < 200 mg/l
   b. Hydrogen sulfide (H2S) < 6 ppm

APPENDIX C-3

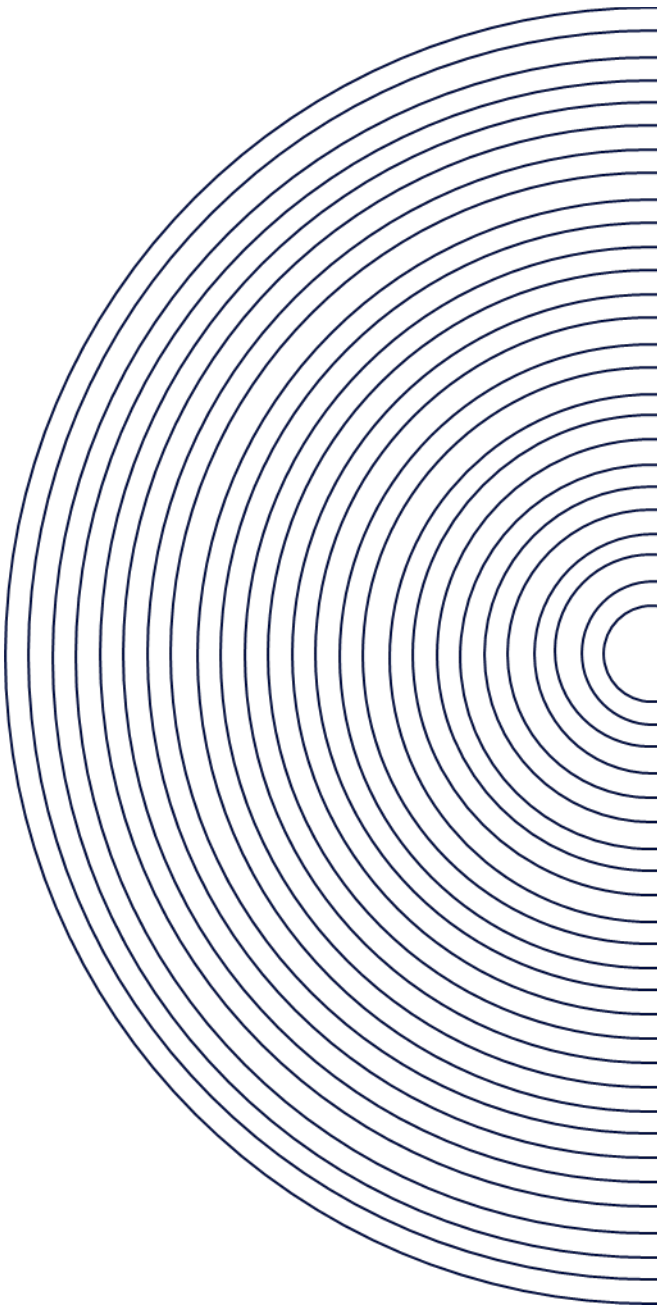
SUEZ MBR SYSTEM, 2/1/2018

Water Technologies & Solutions

budget proposal for the

Orange County NY WWTP

Z-MOD*-L MBR system



submitted to:

HDR
One International Blvd
10th Floor, Suite 1000
Mahwah, NJ 07495

attention: Gary Grey

February 1st, 2018

proposal number: 153453 – revision 2

submitted by:
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table of contents

SUEZ Water Technologies & Solutions confidential and proprietary information

1 Z-MOD-L introduction

Z-MOD Packaged Systems are pre-engineered, modular wastewater treatment systems that bring proven ZeeWeed* membrane bioreactor (MBR) technology to municipal, industrial, or land development applications. Incorporating an integrated, skid-mounted design, Z-MOD Packaged Systems can be quickly set up in virtually any location and feature scalable treatment capacity that can be quickly increased as demand grows. These ultrafiltration (UF) systems outperform conventional treatment alternatives in all categories, offering reduced operating costs, smaller plant footprints, more reliable performance, and high quality effluent that meets or exceeds the world's most stringent discharge and reuse standards.

Z-MOD packaged systems bring the proven large-plant features and performance of ZeeWeed membranes to compact, pre-engineered wastewater treatment systems.

Z-MOD-L systems produce superior quality effluent through an innovative combination of immersed SUEZ Water ZeeWeed* ultrafiltration membranes and a suspended growth biological reactor. ZeeWeed* UF membranes replace the solids separation function of secondary clarifiers and the polishing function of granular media filters that are found in conventional activated sludge systems. By eliminating the need for sludge settling, the Z-MOD MBR process can operate at mixed liquor suspended solids (MLSS) concentrations in the range of 8,000 to 10,000 mg/L, three to five times greater than conventional systems, resulting in designs that are significantly more compact.

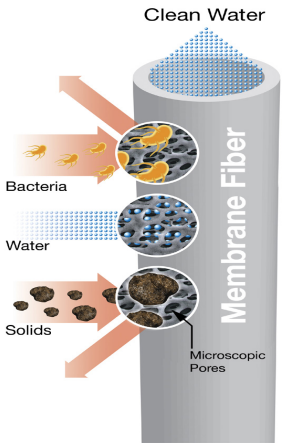
Figure 1: Z-MOD–L Equipment Skid

Fewer processes, combined with PLC control of principal system components, makes plant operation less labor intensive and much more straight forward. Plant operators are only required to perform regular preventive maintenance on membrane system pumps, blowers, and associated mechanical equipment to ensure efficient biological processes and optimum membrane permeation.

At the core of the Z-MOD-L MBR is the ZeeWeed 500 reinforced hollow-fiber membrane—the industry's leading choice for long-life and high performance in the harsh, high-solids environment of a bioreactor. The rugged fibers are held in modular cassettes that are immersed directly into the mixed liquor.

Each cassette has a permeate header that is connected to the suction side of a centrifugal pump, which applies a low-pressure vacuum to draw treated effluent through the microscopic pores of the fibers in an outside-in flow path. This method of permeation minimizes energy demands and prevents particles from fouling and plugging the inside of the membrane fiber.

Outside-in permeation also simplifies membrane cleaning and maintenance, utilizing a stream of coarse bubbles which rise vertically along the length of the membrane to scour rejected solids away from the membrane surface. Periodically, the permeate flow can be automatically reversed to backflush solids that have accumulated on the membrane surface. When necessary, in-tank chemical recovery cleanings can restore membrane permeability to optimum levels.



ZeeWeed UF membranes operate under a low-pressure vacuum, drawing clean water to the inside of the fiber.

2 basis of design

The proposed Z-MOD-L630 system as a part of the SUEZ ZeeWeed MBR package for Orange County WWTP is offered based on the design parameters summarized in the following sections.

2.1 influent flow data

The influent design flows are summarized in the table below.

average day flow, (ADF)	279,600	gpd
maximum month flow, (MMF) **(assumed)**	349,500	gpd
maximum day flow, (MDF)	559,200	gpd
peak hour flow, (PHF)	38,445	gph
maximum flow with one train offline	279,600	gpd

note 1: Any flow conditions that exceed the above-noted flow limits must be equalized prior to treatment in the ZeeWeed membrane bioreactor system.

- (ADF) – the average flow rate occurring over a 24-hour period based on annual flow rate data.
- (MMF) – the average flow rate occurring over a 24-hour period during the 30-day period with the highest flow based on annual flow rate data.
- (MDF) – the maximum flow rate averaged over a 24-hour period occurring within annual flow rate data.
- (PHF) – the maximum flow rate sustained over a 1-hour period based on annual flow rate data.

2.2 influent quality

The design solution proposed is based on the wastewater characteristics detailed below. The below concentrations are specific for the flow used for the biological design as listed in Section 2.5 below.

minimum influent temperature	10	ºC
BOD_5	332	mg/L
TSS	365	mg/L
VSS	282	mg/L
TN	76	mg/L
NH_3-N	13	mg/L
nitrates and nitrites	<1	mg/L
TP	14	mg/L
alkalinity [1,2]	250	mg/L
fats, oils, and grease [3]	131	mg/L

note 1: Parameter value assumed.

note 2: SUEZ is assuming that influent alkalinity is insufficient to ensure proper performance of the biological system. SUEZ has included a NaOH dosing system for pH control in the scope of supply.

note 3: FOG concentration shall not exceed 150 mg/L of emulsified FOG in the feed with no free oil and less than 10 mg/L of mineral or non-biodegradable oil.

2.3 effluent quality

The following performance parameters are expected upon equipment startup and once the biological system has stabilized based on the data listed in Sections 2.1 and 2.2.

BOD_5	<5	mg/L
TSS	<5	mg/L
NH_3-N	<1.5 in Summer <2.2 in Winter	mg/L
TP [1]	<0.5	mg/L
turbidity	<1	NTU

note 1: With coagulant addition.

2.4 influent variability

Influent wastewater flows or loads in excess of the design criteria defined above must be equalized prior to entering the membrane tanks. In the event that the influent exceeds the specifications used in engineering this proposal, or the source of influent changes, the ability of the treatment system to produce the designed treated water quality and/or quantity may be impaired. Buyer may choose to continue to operate the system, but assumes the risk of damage to the system and/or additional costs due to increased membrane cleanings, potential for biological upset and/or increased consumable usage.

2.5 biological system design

The biological system for the Orange County WWTP contains two aerobic trains with the combined volume and characteristics summarized in the table below.

flow basis of biological design (MMF)	349,500	gpd
temperature range	10 - 20	ºC
total aerobic zone working volume (excluding membranes)	160,000	USgal
total design HRT	12.1	hours
total design SRT	11.9	days
design MLSS concentration in bioreactor	8,000	mg/L
minimum design water depth	18	ft
AOR	2,052	lb O_2/ day
sludge wasting rate (based on MMF)	9,310	USgpd

note 1: Tank volumes are preliminary only and may change once final detail design commences.
note 2: The biological system is designed for installation within concrete tanks supplied by buyer.

2.6 ultrafiltration system design

The ultrafiltration system design is summarized in the table below. Membrane modules are assembled into cassettes and cassettes are installed in concrete tanks supplied by buyer.

type of membrane	ZeeWeed 500d
number of trains	2
number of Z-MOD-L permeate pump skids [1]	3
type of cassette	48 module
number of installed cassettes per train	2
number of installed modules per train	64
total number of installed cassettes per plant	4
total number of installed modules per plant	128
membrane spare space	33.3%
membrane tank internal dimensions, each (L x W x H) (ft)	14.7 x 8 x 13

note 1: Each train will have a dedicated Z-MOD-L pump skid plus a common permeate pump skid capable of operating with either membrane train.

note 2: Dimensions are preliminary only and may change after detailed engineering design.

2.7 Z-MOD-L equipment description

The following is a description of the equipment included in SUEZ's scope of supply. Pre-assembled components include the permeate pump skids, membrane cassette assemblies, and chemical addition system skids. Critical items that will be shipped loose for installation by buyer include the master control panel, backpulse tank, blowers, RAS pumps and other equipment. Please refer to Section 2.8 below for a complete list of SUEZ supplied equipment.

master PLC panel

An Allen-Bradley Compact Logix Programmable Logic Controller (PLC) and Panel View Plus 6 1250 Human Machine Interface (HMI), installed in the main control panel, monitors and manages all critical process operations.

The master PLC panel communicates using Ethernet TCP/IP. It includes I/O for common equipment items such as blowers, mixers, air compressors, RAS pumps and other items (if included in SUEZ Scope).

Level controls monitor the level of mixed liquor in the process tanks and transmit this information to the Z-MOD PLC. The PLC will automatically adjust the flow of the Z-MOD trains based on proportional control to the process or membrane tank levels.

process pump equipment

One reversible process pump is assigned to each train and used to draw water through the membranes. The process pump, associated valves and piping are mounted on a factory assembled, epoxy-coated carbon steel skid.

Each process pump skid is designed to include a remote I/O panel, which distributes control wiring to the pump, skid mounted VFD, motor disconnect, and instrumentation including magnetic flowmeter required to operate the pump system.

membrane scour aeration system

One duty membrane blower per train will be supplied (VFD by others). Blowers will typically come complete with required isolation valves, check valves, pressure relief valve, pressure indicators and flow indicators.

sludge wasting system

Sludge wasting is accomplished by periodically diverting mixed liquor from the recirculation return line. The frequency of wasting is a function of influent characteristics, reactor design, and operator preference. In certain operating circumstances, bioreactors can be designed to accommodate client preferences with regards to wasting frequencies; however, the preferred fashion of wasting would be a continuous 24-hour bleeding at fixed flow rate.

process aeration system

The process aeration blowers provide air for the biological tank and ensure that sufficient oxygen is available to maintain the biological processes in the tank. The process aeration blowers are shipped loose for installation on site.

fine bubble diffusers

A fine bubble diffused aeration system delivers air from the process aeration blowers to the aerobic zone of the process tanks.

mixed liquor recirculation equipment

Mixed liquor flows by gravity from the bioreactor to the membrane tank at a rate of 5 × MMF. Recirculation pumps are used to transfer mixed liquor from the the membrane tanks to the bioreactor at a rate of 4 × MMF.

Recirculation pumps will be supplied as well as check valves, isolation valves, magmeters, and pressure indicators. VFD's (by others) are required to vary the RAS flowrate to maintain the membrane tank mixed liquor suspended solids (MLSS) concentration under 12,000 mg/L during maximum day and peak hour flow rates.

sodium hypochlorite dosing system

The sodium hypochlorite dosing system is used for membrane cleaning to remove organic foulants from the membrane surface.

citric acid dosing system

The citric acid dosing system is used for membrane cleaning to remove inorganic scaling from the membrane surface.

pH adjustment system

The pH control system doses sodium hydroxide into the process tank in order to maintain a desired pH for optimal biological performance.

coagulant addition system

The coagulant dosing system is used to feed a metal salt to assist in precipitating phosphorus in the mixed liquor. This precipitate is then filtered by the ZeeWeed 500 ultrafiltration membranes, preventing phosphorus from entering the effluent stream.

effluent flow measurement

Each train will include a flow meter to provide daily discharge flow measurements.

effluent turbidity analyzer

Effluent turbidity analyzers monitor effluent water quality and alert operators if effluent turbidity rises beyond acceptable set point.

InSight Pro – process consulting service

Water and process applications generate vast amounts of operating data. InSight, SUEZ's easy-to-use, cloud-based knowledge management platform, captures and transforms your plant data into meaningful and actionable information, ultimately providing the knowledge you need to maximize performance, avoid operational interruptions, optimize your processes, and reduce the total cost of operation.

InSight Pro – process consulting service has been provided with your MBR system for the first year of operation. InSight Pro pairs you with a SUEZ process expert and provides you a level of personal attention that is currently not available in the market. Your process expert is specifically assigned to your plant and will monitor key parameters on a regular rhythm using InSight. The process expert will be in frequent contact with key members of your operations team to discuss and resolve performance, process and operational issues. While supporting your team with day-to-day operations, the process expert will use InSight to focus on long term trends and provide you with recommendations that will help maximize membrane and equipment life and reduce costs. As part of the service, your process expert will provide process and performance review reports that contain insights to help you improve performance, optimize your process parameters and avoid operational downtime. If the need for troubleshooting does arise, you will have a SUEZ process expert on your team, deeply familiar with your system and empowered with information to assist.

2.8 scope of supply by SUEZ

quantity	description
The MBR system will consist of a Z-MOD-L system including the following equipment:	
ZeeWeed membranes & tankage	
lot	membrane tank cassette mounting assemblies
4	ZeeWeed 500d 48 module membrane cassette
128	membrane module
2 sets	permeate collection & air distribution header piping
2	membrane tank level transmitters
ejector & associated equipment	
2	air ejector assembly w/ air supply assembly
master control panel	
1	master control panel w/ Allen Bradley Compact Logix PLC and Panelview Plus 6 1250 HMI and Flexlogic I/O
process pump skid	
2+1	process pump equipment skid - epoxy coated carbon steel
2+1	positive displacement, reversible lobe permeate pump (2 duty + 1 standby)
2+1	required pump isolation valves and check valve
2+1	remote I/O panel - includes Allen Bradley Flex I/O.
2+1	permeate pump VFD
2+1	motor disconnect
lot	pressure transmitters, pressure gauges, flow meters
lot	chemical injection ports and valves
backpulse system	
included	process pump will also provide backpulse duty
1	backpulse water storage tank, with tank level control and associated valves
membrane air scour blowers	
2	membrane air scour blowers (2 duty) - includes isolation valves, flow switches, and pressure gauges
mixed liquor recirculation & sludge wasting equipment	
2+1	mixed liquor recirculation pumps (2 duty + 1 standby), used to transfer mixed liquor from the membrane tank to the bioreactor - includes isolation valves and pressure gauges
2	flow transmitters
1	automatic isolation valve and flow transmitter for sludge wasting
biological equipment	
2 sets	fine bubble diffuser system for process aeration - loose shipped (without tank downcomer piping)
2+1	process blowers (2 duty + 1 standby) - includes flow switches and isolation valves

quantity	description
2	aerobic dissolved oxygen sensors - common controller for both sensors
chemical dosing systems	
1	coagulant dosing system - includes dosing pump and associated valving
1	pH adjustment system - includes dosing pump and associated valving
2	pH sensor - common controller for both sensors
membrane cleaning systems	
1	sodium hypochlorite chemical feed system - includes dosing pump and associated valving
1	citric acid chemical feed system - includes dosing pump and associated valving
miscellaneous	
1+1	air compressors (1 duty + 1 standby) for pneumatic valve operation and refrigerated air drier
1	common turbidimeter - includes isolation valves, throttle valve and backplate
general	
included	P&IDs and equipment general arrangement and layout drawings for SUEZ supplied equipment
included	operating training
included	operating & maintenance manuals
included	field service and start-up assistance - 24 days support over 2 site visits from SUEZ field-service personnel for commissioning, plant start-up and operator training
included	InSight Pro - Process consulting service - 1 year
included	24/7 emergency phone support - 1 year
included	equipment mechanical warranty - 1 year or 18 months from shipment
included	membrane warranty - 5 year (2 year cliff and 3 year prorated)

note 1: Additional man-hours will be billed separately from the proposed system capital cost at a rate of $1,300 per day plus living and traveling expenses. Detailed SUEZ service rates are available upon request.

note 2: All SUEZ supplied equipment is designed for installation in an unclassified area.

note 3: To receive complete 24/7 Emergency Telephone Technical Support Service and to allow for InSight Monitor Service, a suitable secure remote internet connection, by buyer, is required.

3 buyer scope of supply

The following items are for supply by buyer and will include, but are not limited to:

- ❑ overall plant design responsibility
- ❑ installation on site of all SUEZ-supplied skids and loose-shipped equipment
- ❑ review and approval of design parameters related to the biological process and membrane separation system
- ❑ review and approval of SUEZ supplied equipment drawings and specifications
- ❑ detail drawings of all termination points where SUEZ equipment or materials tie into equipment or materials supplied by others
- ❑ equipment foundations, civil work, full floor coverage equipment contact pads, buildings, etc.
- ❑ receiving, unloading and safe storage of SUEZ-supplied equipment at site until ready for installation
- ❑ HVAC equipment design, specifications and installation (where applicable)
- ❑ UPS, Power Conditioner, Emergency power supply and specification (where applicable)
- ❑ lifting devices including crane able to lift 6,000 lbs for membrane removal, lifting davit crane and guide rails for submersible mixers and pumps, hoists, etc.
- ❑ MCC, VFD's, or Starters for 3-ph motors, including all loose ship SUEZ supplied equipment
- ❑ 1 to 2 mm pretreatment fine screen
- ❑ equalization tank and associated equipment - as required
- ❑ bioreactor tank - complete with anoxic and aerobic zones
- ❑ membrane tanks c/w tank covers, grating, and their support over membrane tanks
- ❑ all chemical storage tanks, day tanks, and containments
- ❑ treated water storage tank - as required
- ❑ acoustical enclosures for membrane and process blowers
- ❑ process and utilities piping, pipe supports, hangers, valves, etc. including but not limited to:
- ❑ piping, pipe supports and valves between SUEZ-supplied equipment and other plant process equipment
- ❑ piping between any loose-supplied SUEZ equipment
- ❑ process tank aeration system air piping, equalization tank system piping, etc.

- ❑ interconnecting pipe between SUEZ-supplied skids and tanks (as applicable)
- ❑ electrical wiring, conduit and other appurtenances required to provide power connections as required from the electrical power source to the SUEZ control panel and from the control panel to any electrical equipment, pump motors and instruments external to the SUEZ-supplied enclosure
- ❑ suitable, secure remote internet connection for 24/7 emergency telephone technical support service and InSight remote monitoring & diagnostics service
- ❑ all bolts, brackets and fasteners to install SUEZ-supplied equipment. Seismic structural analysis and anchor bolt sizing
- ❑ alignment of rotating equipment
- ❑ raw materials, chemicals, and utilities during equipment start-up and operation
- ❑ supply of seed sludge for biological process start-up purposes
- ❑ disposal of initial start-up wastewater and associated chemicals
- ❑ weather protection as required for all SUEZ supplied equipment. Skids and electrical panels are designed for indoor operation and will need shelter from the elements.
- ❑ laboratory services, operating and maintenance personnel during equipment checkout, start-up and operation
- ❑ touch up primer and finish paint surfaces on equipment as required at the completion of the project
- ❑ all permits

4 commercial

4.1 pricing

Pricing for the proposed equipment and services, as outlined in Section 2.8, is summarized in the table below. All pricing is based on the design operating conditions and influent characteristics that are detailed in Section 2 of the proposal. The pricing herein is for budgetary purposes only and does not constitute an offer of sale. No sales, consumer use or other similar taxes or duties are included in the pricing below.

price: all equipment & service	
Z-MOD-L system, as per Section 2.8	$ 1,011,000 USD

4.2 annual power & chemical consumption estimates

The data presented below is for information purposes only and is based on the design information provided by the Buyer and presuming that the equipment is operated according to the design basis and in accordance with Seller's Operations and Maintenance manuals.

annual power consumption estimate [1]

equipment	**kWh/year**
permeate pumps [2]	8,760
membrane blowers	23,725
process blowers	142,350
recirculation pumps	23,250
air compressors	900
total	**198,985**

note 1: Annual power consumption estimate is calculated at ADF condition.

note 2: Assumes membrane relaxation mode used.

equipment design capacity

equipment	**design capacity**	**HP**
permeate pumps	351 gpm @ 18.9 ft TDH	15
membrane blowers	442 scfm @ 6.5 psig	20
process blowers	365 scfm @ 8.8 psig	30
recirculation pumps	777 gpm @ 10 ft TDH	10
air compressors	22.6 acfm @ 175 psig	7.5

annual chemical consumption estimate

chemical	USgal/year
sodium hypochlorite (10.3% w/w, SG: 1.168)	323
citric acid (50.0% w/w, SG: 1.24)	245
ferric chloride (42.0% w/w, SG: 1.45)	8,410
sodium hydroxide (50.0% w/w, SG:1.24)	31,273

note 1: Annual chemical consumption estimate is calculated at ADF conditions.

note 2: Chemical consumption estimates are based on the frequencies and concentrations summarized in the table below. Actual chemical consumption may change with final design, or may change once system is in operation.

note 3: NaOH consumption assumes that the influent alkalinity is 250 mg/L.

basis of chemical consumption estimates

chemical		frequency	concentration
sodium hypochlorite	maintenance clean	2 times per week	200 mg/L
	recovery clean	2 times per year	1,000 mg/L
citric acid	maintenance clean	1 time per week	2,000 mg/L
	recovery clean	2 times per year	2,000 mg/L
ferric chloride		continuous	50.11 mg/L
sodium hydroxide		continuous	232.84 mg/L

4.3 freight

The following freight terms used are as defined by INCOTERMS 2010. All pricing is DDP project site.

4.4 equipment shipment and delivery

Equipment shipment is estimated at 24 to 36 weeks after order acceptance. The buyer and seller will arrange a kick-off meeting after contract acceptance to develop a firm shipment schedule.

typical drawing submission and equipment shipment schedule

		6-8 weeks	2 weeks	16-26 weeks		2 weeks
acceptance of PO						
submission of drawings						
drawings approval						
equipment manufacturing						
equipment shipment						
plant operations manuals						

The delivery schedule is presented based on current workload backlogs and production capacity. This estimated delivery schedule assumes no more than 2 weeks for buyer review of submittal drawings. Any delays in buyer approvals or requested changes may result in additional charges and/or a delay to the schedule.

4.5 conditional offering

Buyer understands that this proposal has been issued based upon the information provided by buyer, and currently available to seller, at the time of proposal issuance. Any changes or discrepancies in site conditions (including but not limited to system influent characteristics, changes in environmental health and safety ("EH&S") conditions, and/or newly discovered EH&S concerns, buyer's financial standing, Buyer's requirements, or any other relevant change, or discrepancy in, the factual basis upon which this proposal was created, may lead to changes in the offering, including but not limited to changes in pricing, warranties, quoted specifications, or terms and conditions. Seller's offering in this proposal is conditioned upon a full seller EH&S, and buyer financial review.

4.6 terms and conditions of sale

This proposal has been prepared and is submitted based on seller's standard terms and conditions of sale.

APPENDIX C-4

SUEZ UV, 1/30/2018

Aquaray® 40 “HO” Vertical Lamp Ultraviolet Disinfection Equipment

Preliminary Budget Proposal
For
Orange County, NY

January 30, 2018

SUEZ Treatment Solutions Inc.
600 Willow Tree Road
Leonia, NJ 07605, USA
Tel: +1 201 676 2525

January 30, 2018

To: Gary M. Grey
HDR

Re: Aquaray® 40 HO Vertical Lamp Ultraviolet Disinfection Equipment
Orange County, NY

In accordance with your recent request, we are pleased to submit our preliminary proposal for the Aquaray® 40 HO Vertical Lamp ultraviolet disinfection system for the above referenced project. The Aquaray® 40 HO Vertical Lamp System has been proven through extensive use worldwide (over 400 Aquaray installations) to be a very effective and reliable UV disinfection system. The system's many features make operation and maintenance cost effective, easy, and safe. These features include:

- Third-Party validated (Hydroqual Inc.) UV system performance
- Title-22 reuse approved
- Fully automated operation. Only requires a 4-20 mA flow signal
- Easy maintenance without the need to remove equipment from channel for lamp and ballast replacement.
- Highest turndown of any UV system in the market. Automatic dose control is achieved turning on/off lamps in relation to a flow signal, ensuring that the plant is operated economically while still providing the required performance.
- Lowest lamp replacement cost of any UV system in the market ($25 per lamp)

If you have any questions or require any additional information, please don't hesitate to contact our Representative below or the writer.

Local Sales Representative
Robert Fenton
GP Jager Inc.
PO Box 50
Boonton, NJ 07005
Phone: 973-750-1180
Cell: 201-412-4370
Email: bfenton@jagerinc.com

SUEZ Regional Manager
Paul Ravelli
SUEZ Treatment Solutions Inc.
Tel: 856-761-2407
Email: paul.ravelli@suez-na.com

Sincerely,

For SUEZ Treatment Solutions Inc.

George Vrachimis
Applications Engineer
201-676-2227
George.Vrachimis@suez-na.com

AQUARAY® 40 HO (High Output) SYSTEM DESCRIPTION

The Aquaray® 40 "HO" system is latest generation and improvement of the previous Aquaray® VLS design which has been in use around the world since 1986. The Aquaray® 40 "HO" VLS System is based on the arrangement of the original Aquaray® 40 VLS "Type-B" design. The vertical lamp orientation and configuration has been proven, through general use and extensive pilot studies, to be a very effective form of disinfection. The system also has many features that make it easy and safe to operate and maintain.

The low pressure, low intensity lamps of the original Aquaray® 40 VLS have been replaced with new low pressure, high output lamps - requiring fewer lamps to treat the same capacity. Fewer lamps guarantee considerable savings on capital, operation, and maintenance costs.

UV DOSAGE ENHANCEMENT:

The ultraviolet dosage is the product of the ultraviolet intensity multiplied by the time (in seconds) that the water is in contact with that UV intensity. Based on completed bioassays, the Aquaray® HO VLS system can treat more than twice the flow compared to the standard low pressure low intensity lamps in an Aquaray® 40 configuration with the same UV dosage (uWatts-secs/cm^2) requirement. Flow deflection baffles have been added to enhance the disinfection performance capability of the Aquaray® HO VLS system.

HIGH OUTPUT LAMP ARRANGEMENT:

The ultraviolet lamps are mounted vertically so that all electrical connections are made out of the water and within the protection of a NEMA 4X stainless steel enclosure. Unlike other designs, all the lamps are easily accessed through the lid of this enclosure. Therefore, routine service such as lamp changes can be made without having to remove the lamp modules from the channel.

The lamps are also mounted in a uniform staggered array, three inch on center across the channel and five inch on center along the channel. This ensures a semi-tortuous path so that every particle of water will come into intimate contact with the most intense point of lamp output.

MODULE ARRANGEMENT:

The number and layout of the modules within the channel is determined based on the required UV dosage and a UV path for the water that eliminates any possibility of hydraulic short-circuiting.

See “DESIGN BRIEF” for details of module arrangement for this project.

CONTROL AND MONITORING:

Electronic lamp control is utilized to minimize power consumption. Electronic lamp control assemblies are conveniently mounted in the Aquaray® High Output Module’s NEMA-4X enclosure. This locates the assemblies close to the high output lamps, which minimizes the effect of outside interference such as radio waves, lightning, and voltage spikes.

With our Aquaray® High Output Module each individual lamp is monitored through the use of an on-board computer called a Data Controller Assembly (DCA). The DCA gathers and stores information relative to individual lamp hours and cycles. A non-volatile memory is included so that a possible relocation of the module will not result in a loss or misdirection of valuable lamp data.

The benefits of recording the individual lamp history may not be immediately apparent. UV lamps are guaranteed to provide a minimum operating life measured in terms of active operating hours, usually up to 13,000 hours. If a lamp fails electrically before the guarantee, our end-of-lamp life conditional warranty provides for a replacement at a cost pro-rated to the actual use achieved with the original lamp. For example, if a lamp fails at mid-life the replacement will be provided at half price.

A Power Distribution and Data Center (PDDC) included which houses the load center enclosure and GFCI Breakers for each high output module. The PDDC also includes the Allen CompactLogix PLC and Panelview 1000 Plus Operator Interface. Each Aquaray ® High Output module in the UV disinfection channel receives power from the load center locally mounted at the PDDC via a single power cable with waterproof plug-in connectors.

Each Aquaray® High Output module is fully independent and capable of automatic, fail safe operation in case of a control fault. This “default on” design ensures continuous disinfection even under emergency conditions.

FLOW PACING:

Flow Pacing is a system whereby lamp rows are switched on and off in relation to plant flow variations. The Aquaray® 40 HO System provides for very fine adjustments of the number of High Output lamps in service. Adjustments are made in direct proportion to the flow, with switching increments as low as 3%. To take full advantage of this feature we take a control signal, usually from the plant flow meter, and switch the lamps on or off as the flow changes.

The advantage of being able to switch the lamps by row is twofold:

- Energy Conservation
- Lamp Conservation

In our system each lamp requires 165 Watts. You realize immediate savings by activating only the minimum number of lamps required.

SYSTEM CLEANING:

Any UV system gradually accumulates a coating on the quartz sleeves housing the lamps. This routine fouling must be removed periodically. The Aquaray® 40 HO VLS System offers a fully automatic, in-channel cleaning system which reduces maintenance. The automatic wiping system is to be operated once daily and the wipers are to be replaced once every two years. This system is included in our proposal.

SERVICE:

Every piece of equipment within a wastewater plant requires service. The Aquaray® 40 HO VLS System has been developed to permit easy troubleshooting and quick replacement of components. The majority of maintenance activities can be carried out while the equipment is still located within the channel. The recommended spares included in this proposal will ensure that the system can be maintained efficiently and brought back to full operation in the shortest possible time.

DESIGN BRIEF

PLANT INFORMATION AND DESIGN BASIS:

Plant Location ..... Orange County, NY

Peak Flow ..... 38,445 GPH (922,680 GPD)
Maximum Daily Flow ..... 559,200 GPD
Design Average Daily Flow ..... 279,600 GPD

UVT…… ..... 65% minimum (Assumed)
TSS……<30 mg/L (Assumed average)
Permit, Fecal Coliform..... 200 CFU/100mL (30 day average)
..... 400 CFU/100mL (7 day average)

Minimum UV Dose ..... 30 mJ/cm^2

SUMMARY:

The system proposed will provide a minimum UV dosage of 30 mJ/cm^2, at the peak flow. The dosage calculation takes into account several factors including the end of lamp life, the quartz sleeve transmittance factor, and the peak capacity.

Based on the peak hourly flow of 38,445 GPH (922,680 GPD) and an assumed minimum UVT of 65%, we are proposing one (1) UV disinfection channel, with two (2) Aquaray® 40 HO modules mounted one (1) across by two (2) banks in series per channel (1 duty + 1 standby). The total number of Aquaray® 40 HO UV modules is two (2) at the peak flow of 38,445 GPH (922,680 GPD) with one bank out of service.

Each Aquaray® 40 HO module includes 40 Low Pressure High Output Lamps, arranged in five rows of eight lamps each.

PROPOSED AQUARAY® 40 HO VERTICAL LAMP SYSTEM DESIGN:

Peak Flow, MGD	0.923 MGD
% UV Transmission	65% minimum (Assumed)
Bioassay UV Dosage at Peak Flow, mJ/cm^2	***30 mJ/cm^2***
Number of Channels	1
Number of Modules Across (Modules per Bank)	1
Number of Modules in Series (Number of Banks)	2 (1 duty + 1 standby)
Channel Width, in.	24.5 inches
Channel Length, ft.	17 feet
Channel Depth, in.	72 inches
Water Levels	57.5 to 62 inches
Aquaray® Modules/Channel	2
Total Number of Modules	2
Number of Lamps/Module	40
Total Number of Lamps	80
Headloss across all the UV modules, in.	0.06 inches
Power Consumption per Lamp, W	165 watts
Power Consumption at Peak Hourly Flow (922,680 GPD), kW	6.60 kW
Power Consumption at Maximum Daily Flow (559,200 MGD), kW	5.28 kW
Power Consumption at Average Daily Flow (279,600 MGD), kW	3.96 kW
Total Installed Power, kW	13.2 kW

SPARE PART REPLACEMENT COST:

UV Lamps (13,000 hour warranty)	$25
Sleeves (5 year warranty)	$25
Ballasts (5 year warranty)	$200

SCOPE OF SUPPLY AND BUDGET PRICE

We propose to furnish the following equipment for the Aquaray® 40 HO Vertical Lamp ultraviolet disinfection system described in the previous sections

- Aquaray® 40 HO Vertical UV modules with Automatic Cleaning Wipers, 316L stainless steel components
- Mounting Rail/Eye Shields, 304 stainless steel
- Power Distribution & Data Center(s) (PDDC) – Includes Allen Bradley CompactLogix PLC with Panelview 1000 Plus Operator Interface
- Wireway
- Stepdown Transformer(s)
- Interconnecting Cables between the Modules and the Data Control Center and between the Modules and Power Distribution Center(s)
- Lamp Row by Row Flow Pacing
- In-Channel Cleaning System (automatic cleaning wipers)
- Level Control Weirs
- Lifting Spreader Bar
- Anchor Bolts
- Recommended Spare Parts

The following will also be included:

- Freight to the jobsite
- Start-up service: five (5) days in one (1) trip
- Four (4) O&M manuals

Note that the following items are to be provided by others (unless indicated otherwise above):

- Jib Crane and Hoist (1/2 ton capacity)
- Channel Grating
- Slide Gates
- Remote Computer System
- Installation
- Embedded Conduits
- Sampling and Effluent Performance Testing

BUDGET PRICE: Our current budget estimating price, not including the optional adders above, is (PRICE TO BE PROVIDED BY SUEZ TREATMENT SOLUTIONS REPRESENTATIVE). This price will be valid for one (1) year; payment terms will be as below and commercial terms and conditions are given on the following page. The price is in accordance with the Scope of Supply and terms of this proposal and any changes may require the price to be adjusted.

Payment Terms:

10% Net Cash, Payable in thirty (30) days from date of submittal of initial drawings for approval;

80% Net Cash, Payable in progress payments thirty (30) days from dates of respective shipments of the Products;

10% Net Cash, Payable in thirty (30) days from Product installation and acceptance or Ninety (90) days after date of final Product delivery, whichever occurs first.

SCHEDULE: Approval drawings and data can be submitted approximately 4-6 weeks after agreement to all terms, as evidenced by SUEZ's receipt of this proposal, fully executed; or, in the event that Purchaser issues a Purchase Order, SUEZ's receipt of fully executed letter agreement. SUEZ estimates that shipment of the Products can be made in approximately 14-16 weeks after SUEZ has received from Purchaser final approval of all submittal drawings and data.

Typical Aquaray® 40 “HO” Vertical Lamp Ultraviolet Disinfection System Installations

Plant Location: Selkirk, MB

Peak Flow: 12 MGD

Number of Channels: 2

Number of Modules: 3 per channel (6 total)

Typical Aquaray® 40 “HO” Vertical Lamp Ultraviolet Disinfection System Installations

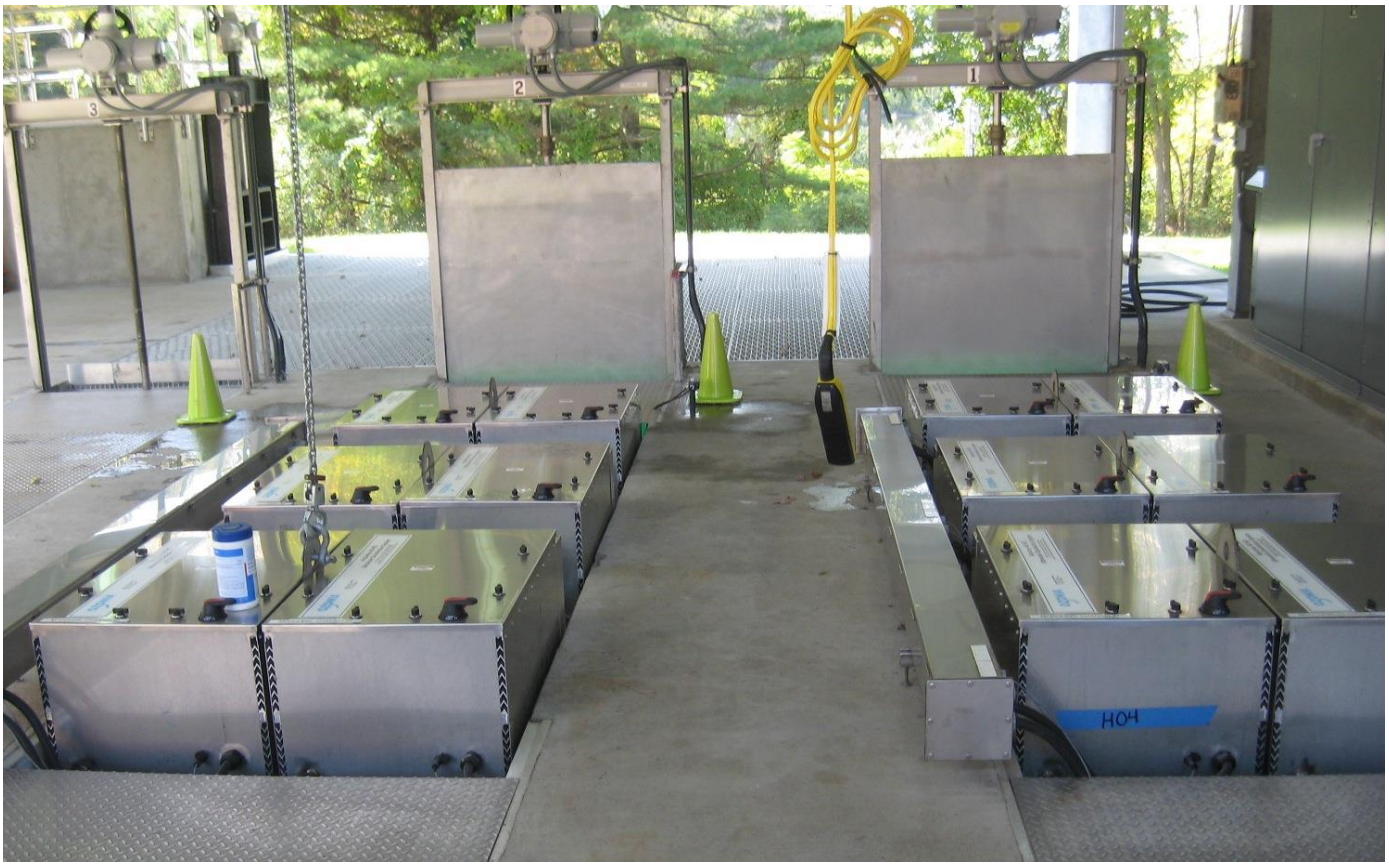
Plant Location: Chalfont – New Britain, PA

Peak Flow: 20 MGD

Number of Channels: 2

Number of Modules: 4 per channel (8 total)

Typical Aquaray® 40 “HO” Vertical Lamp Ultraviolet Disinfection System Installations



Plant Location: Peekskill, NY

Peak Flow: 24 MGD

Number of Channels: 2

Number of Modules: 6 per channel (12 total)

Typical Aquaray® 40 “HO” Vertical Lamp Ultraviolet Disinfection System Installations

Plant Location: Greensburg, PA

Peak Flow: 20 MGD

Number of Channels: 2

Number of Modules: 4 per channel (8 total)

APPENDIX C-5

ASHBROOK FILTER PRESS, 9/24/2015

September 24, 2015

To: Mr. Dennis Scannell
HDR
Mahwah, NJ

Alfa Laval Ashbrook
Simon-Hartley, Inc.
11600 East Hardy
Houston, TX 77093
USA
Tel: +1 800-362-9041
Fax: +1 281-449-1324

Subject: Orange Co., NY
Budget Proposal: KP05 BFP

Dear Mr. Scannell,

On behalf of Alfa Laval Ashbrook Simon-Hartley, Inc. ("Alfa Laval ASH") and Sherwood – Logan & Associates, Inc., we thank you for the opportunity to offer the following budget proposal.

Biosolids Dewatering Design Basis	
Type of Sludge	MBR sludge wasting or after GBT
Feed Sludge Concentration	.08% or 2%
Total Solids Loading	700 dry lbs/day or 1751 dry lbs per day
No. Of Units	1

One (1) Alfa Laval AS-H Belt Press (Klampress® KP05), 0.5 meter Belt Filter Press (BFP) complete with hydraulic system for belt tensioning. The frame will be hot dipped galvanized carbon steel. The chicane rods and holders, wash box enclosure, grids shall be galvanized carbon steel. The drain trays, sludge containment barriers, and discharge chute shall be constructed of Type 304 stainless steel . The VFD for the belt drive will be mounted on the BFP frame.

One (1) Main Control Panel, will be powered from a 480 VAC power source, supplied by others. IEC style motor starters will be supplied for the conveyor, washwater pump, sludge pump, and hydraulic pump. 120 VAC power for the polymer system will be provided. All other starters / controllers will be supplied by others.

The BFP Control Panel will be a NEMA 4X fiberglass enclosure. The controls for the BFP and ancillary equipment will be manually controlled. START/STOP pushbuttons with RUNNING status lights will be provided for control of the conveyor, washwater pump/valve, hydraulic pump, sludge pump, and the polymer pump.

Operator interface will be accomplished using Square D, Type ZB pilot devices. All logic will be performed via relays, with NO network communication capabilities. The control panel shall be mounted on the BFP frame.

One (1) Non-clog, variable orifice mixer, complete with injection manifold system and a four port vortex polymer injection ring. The mixer shall be constructed of aluminum.

(1) Lot Spare Parts, which shall be provided as follows:
One set of belts
Two sets of scraper blades
Two sets of rubber seals for the gravity zone & washbox
One bearing of each size used

(1) Lot Field service, one service technician shall be supplied as follows:
One Trip, Five Days for start-up and training.

(1) Lot Freight, this shall be to the jobsite. (offloading to be by others).

BUDGET PRICE FOR ONE (1) ALFA LAVAL AS-H BELT PRESS (KLAMPRESS®KP05),

$ 122,789.00

Estimated cake solids ranges from 15-18% for the 2 sludge flows described above.

WASH WATER REQUIREMENT:
- 18 GPM at minimum of 85 PSI

BFP POWER REQUIREMENTS:
- 1.5 HP BELT DRIVE UNIT, 1 HP HYDRAULIC UNIT

Also included in the pricing:
- Operation and Maintenance Manuals
- Submittals with drawings

Not included in pricing are the following:
- Interconnecting piping and wiring between Alfa Laval ASH equipment and other ancillary equipment
- Equipment installation
- Polymer and Lab services for the performance test and start up (unless noted otherwise)
- Local motor disconnect devices and / or local motor lockouts.
- Offloading at jobsite
- Storage and Handling charges

NOTES OF CLARIFICATION:

1. Warranty covers defects in materials and workmanship for twelve (12) months after startup or beneficial use or eighteen (18) months after shipment whichever comes sooner. Alfa Laval ASH reserves the right to review operating and maintenance records to ensure compliance.

2. Any additional service time resulting from non-warranty delays will be charged in accordance with the field service rate schedule in effect at the time of service.

3. The process performance (cake solids, capture, hydraulic throughput, etc.) achieved by the belt filter press is dependent on sludge quality (age, grit content, etc.), SVI, volatile content and origin of the sludge.

4. Installing contractor is responsible for maintaining all relevant electrical codes.

5. Anything not explicitly stated in this proposal is not included.

6. This is a budgetary quotation and it should not be considered binding.

If you have any questions or require any additional information, please contact our local representative, Jim Konatsotis with Sherwood-Logan & Associates, Inc. at 203-981-9301 or me at 512-364-8241.

Sincerely,

Ron Drake
Regional Sales Manager
Market Unit Environment

Cc: Sherwood-Logan & Associates, Inc. / Jim Konatsotis

Lee, Bonita

From: Joseph Polomene, P.E. <polomene.j@sherwoodlogan.com>
Sent: Friday, September 25, 2015 9:04 AM
To: Lee, Bonita
Cc: Scannell, Dennis; 'Jim Konatsotis'
Subject: RE: Sullivan County Dewatering.
Attachments: KP05 BUDGET PROPOSAL-ORANGE CO.PDF; 3 Belt Klampress Belt Press.pdf

Hey Bonita: Here is the Klampress proposal. Please note that the price is for the press only. Alfa Laval/Ashbrook can also provide a "skidded" system with press, sludge feed pump, polymer makeup system, controls and control devices. The cost for the skidded system is $205,000.

In addition to the proposal, attached is the Klampress brochure. I've requested a generic drawing of both the 0.5M press and the skidded system.

As always, please call with any questions.

Joe

Best regards,

Joseph Polomene, P.E.
Sherwood Logan & Associates
188 Bayview Avenue
South Amboy, New Jersey 08879
Telephone: (732) 877-8781

From: Lee, Bonita [mailto:Bonita.Lee@hdrinc.com]
Sent: Wednesday, September 23, 2015 5:17 PM
To: polomene.j@sherwoodlogan.com; 'Jim Konatsotis' <konatsotis.j@sherwoodlogan.com>
Cc: Scannell, Dennis <Dennis.Scannell@hdrinc.com>
Subject: RE: Sullivan County Dewatering.

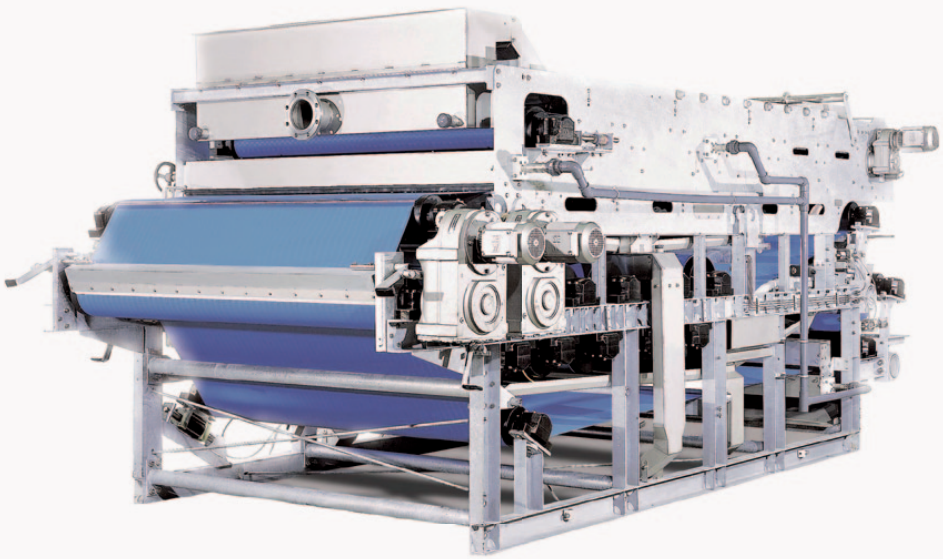
Hi Joe,

I saw a Huber Thickener proposal that you have provided to Krissy in January, which is why I assumed we need a thickener. Was that quoted for some other purpose?

If the thickener is redundant for sludge dewatering, we can remove the thickener. Please provide an expedited proposal for the Belt Filter Press (KlamPress) to dewater the sludge from MBR (10,500 gpd @ 8000 mlss concentration) to 21-22% for hauling. Please include a polymer feed system as an adder in the proposal.

3 Belt Klampress Belt Press

Sludge thickening and dewatering machine



Features

The Klampress 3 Belt with independent gravity deck has the capability to take feed sludges that are less than 1% dry solids and thicken more efficiently in the gravity section, so that the sludge is better prepared for the high pressure zone. The independent gravity deck has the ability to run at different speeds than the pressure zone, therefore, thinner sludges can be fed at high hydraulic feed rates to a faster moving belt on the gravity section. The result is a machine that is not limited to the standard hydraulic and loading rates of typical two belt machines.The 3-Belt machine is specifically designed for sludges with feed solids less than 1.5%, which means that the plant can eliminate the need for a gravity thickener or holding tank to thicken sludge prior to the belt press.

Benefits

- Up to 5 times higher throughputs using same footprint as conventional belt press
- 1-2% points higher cake solids performance with dilute sludges
- Independent belts for gravity and pressure section
- More forgiving/flexible with different incoming feed solids
- Dual function as gravity belt thickener or belt filter press option
- Available in variety of pressure profiles, including high solids version

Configuration

- Available in 8 roller and 12 roller designs in the pressure section
- Open frame design maximizes access
- Available in a fully odour-enclosed format with removable panels allowing for easy access
- Available with 3-Belt design - independent gravity deck for sludge that has less than 1.5% dry solids

Ashbrook Simon-Hartley

Bearings
The Klampress® is equipped with lifetime-rated bearings. Each bearing is protected from contaminates with triple-labyrinth seals and shaft -mounted splash guards

Belt alignment
Operator specified belt tensioning is automatically maintained by the Klampress® SmartPress™ system, recognising subtle condition variations such as belt stretching or process changes.

Gravity dewatering zone
The arrangement of the Klampress® gravity drainage zone ensures the even distribution of the conditioned slurry over the effective width of the moving filter belt

Sludge/poly mixer valve
The Klampress® is equipped with a proprietary variable orifice, in-line polymer mixer that combines polymer and slurry instantly (in less than one second). This advanced, non-clog, static mixer is known for the mixing precision and adjustable throat which allow direct control of mixing energy. Its design optimises polymer effectiveness and minimises polymer consumption

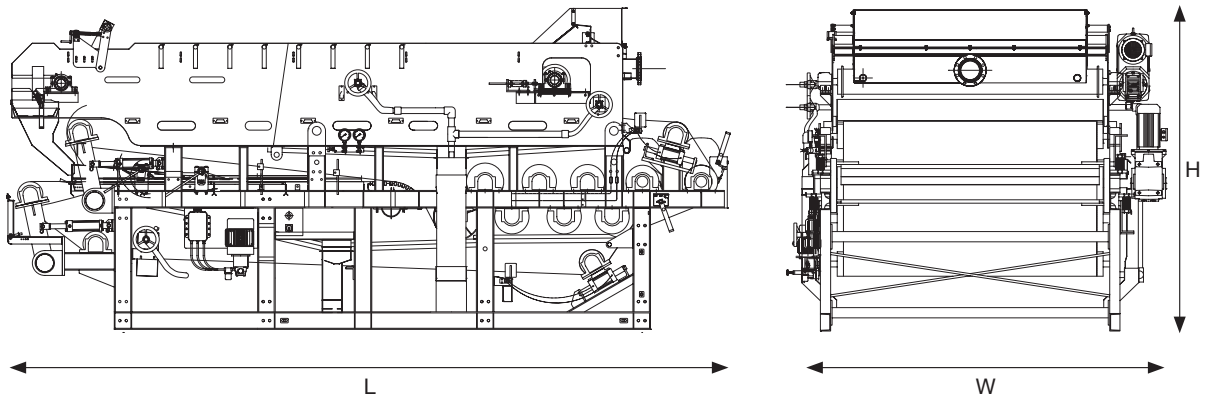
Bearings
- Heavy duty bearings with triple-labyrinth seals
- Extended lubrication cycle (six monthly)
- Shaft mounted splash guards
- Positioned for easy installation

Wedge zone
Adjustable wedge dewatering zone initiates the application of pressure to the dewatering process

Belt alignment
SmartPress™ Belt Alignment System ensures continuous, smooth guidance control without the need for operator intervention.

Belt tensioning
- Operator specified belt tensioning is automatically maintained, recognizing subtle condition variations such as belt stretching or process changes
- Easy to operate and maintain

Thickening and dewatering zones
- Independent gravity section
- Full-pressure dewatering zone – pressure is gently increased as the sludge passes through 8 or 12 pressure rollers
- Radial grid and perforated roller accelerate dewatering through shear forces Better process performance



Dimensions

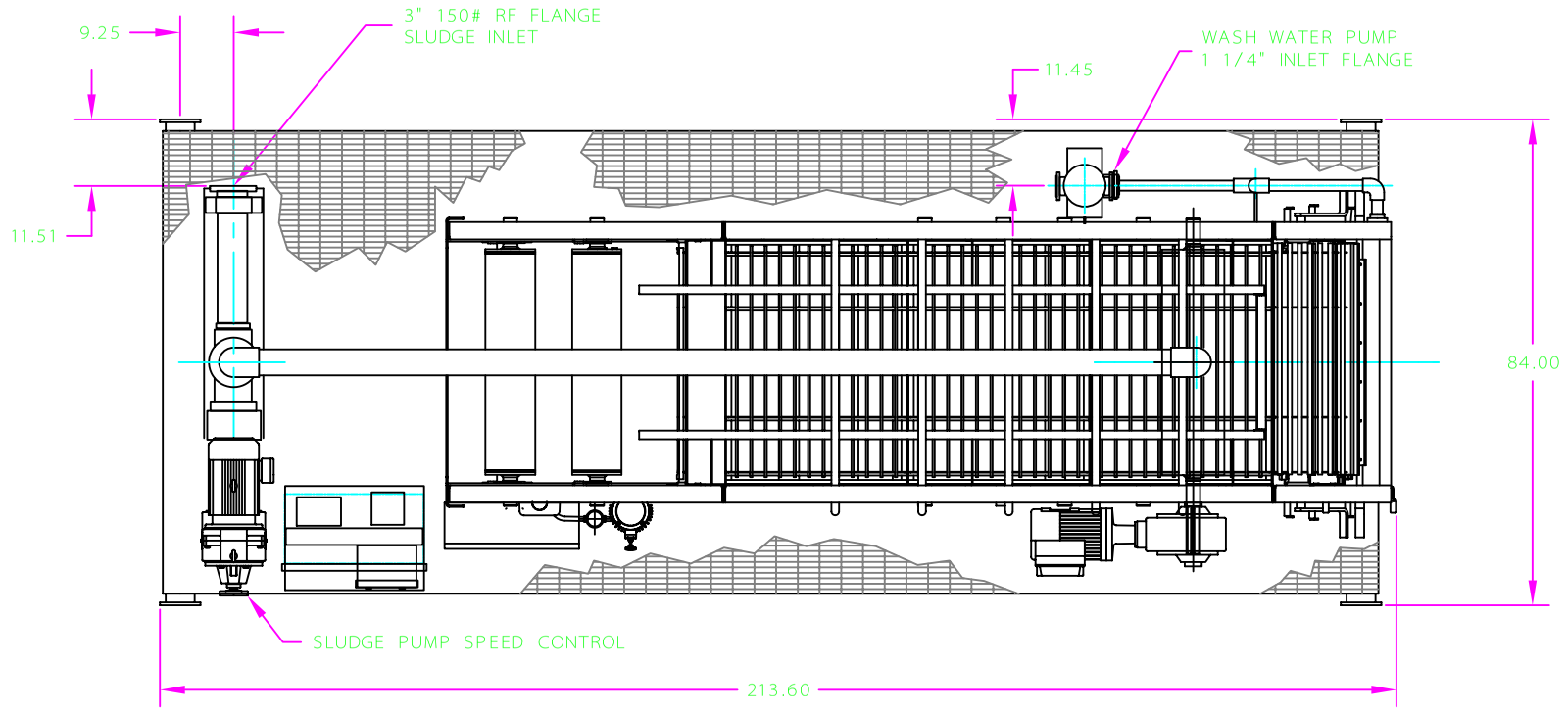
Model	Length	Width	Height	Weight (dry)
1 m	6,240 mm (245 inch)	2,077 mm (82 inch)	3,900 mm (153 inch)**	9,235 kg (20,359 lbs)
1.5 m	6,240 mm (245 inch)	2,585 mm (102 inch)	3,900 mm (153 inch)**	11,360 kg (25,044 lbs)
2 m	6,240 mm (245 inch)	3,094 mm (122 inch)	3,900 mm (153 inch)**	13,900 kg (30,644 lbs)

* Overall machine heights include standard 300mm high plinth. ** Includes odour hood.

PEE00324EN 1304

How to contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com

B4MATR2.DWG REV. 2



FIELD HOOK UP INFO.

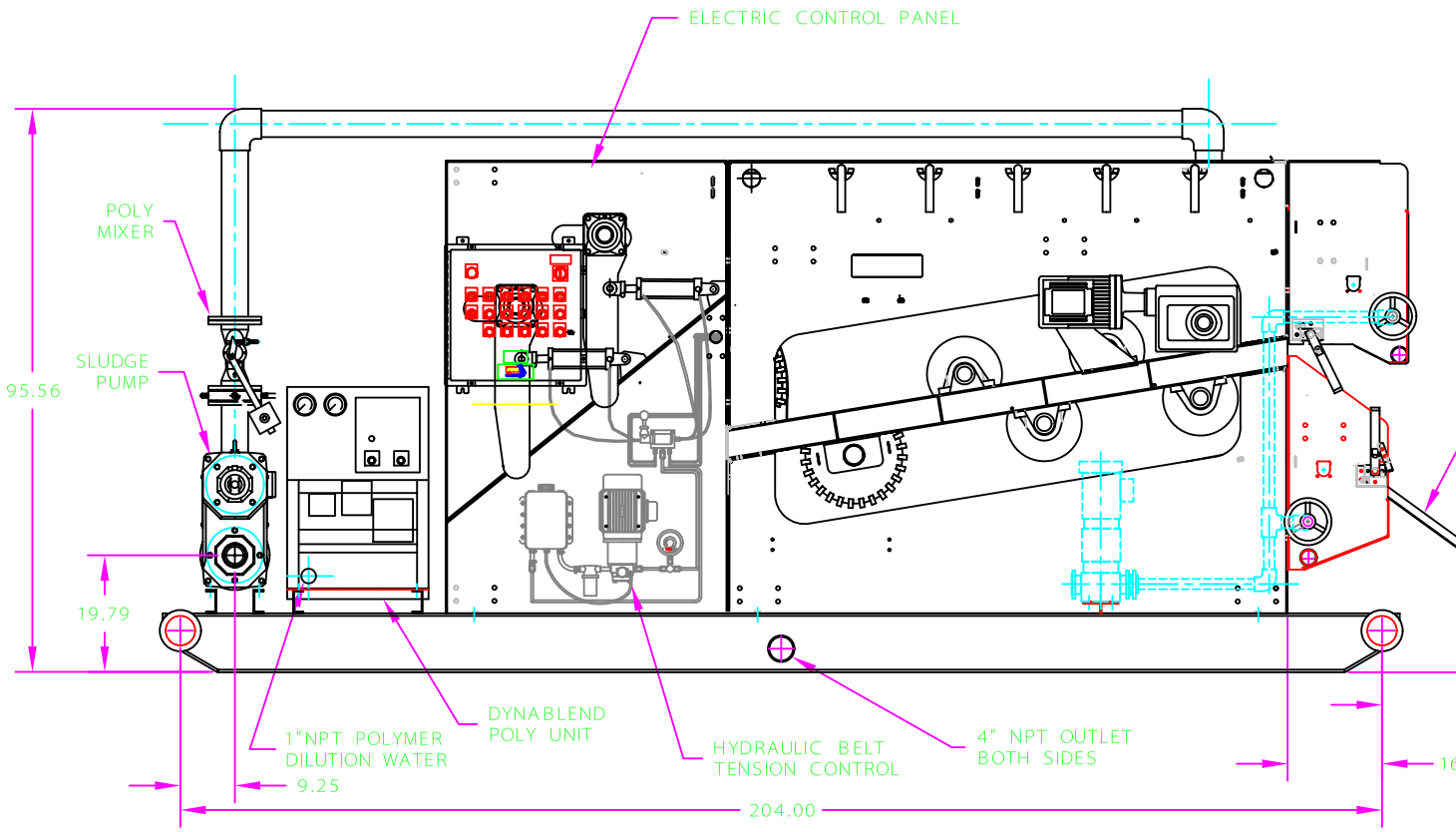
ELECTRICAL
480 VAC, 3 PH, 30 A

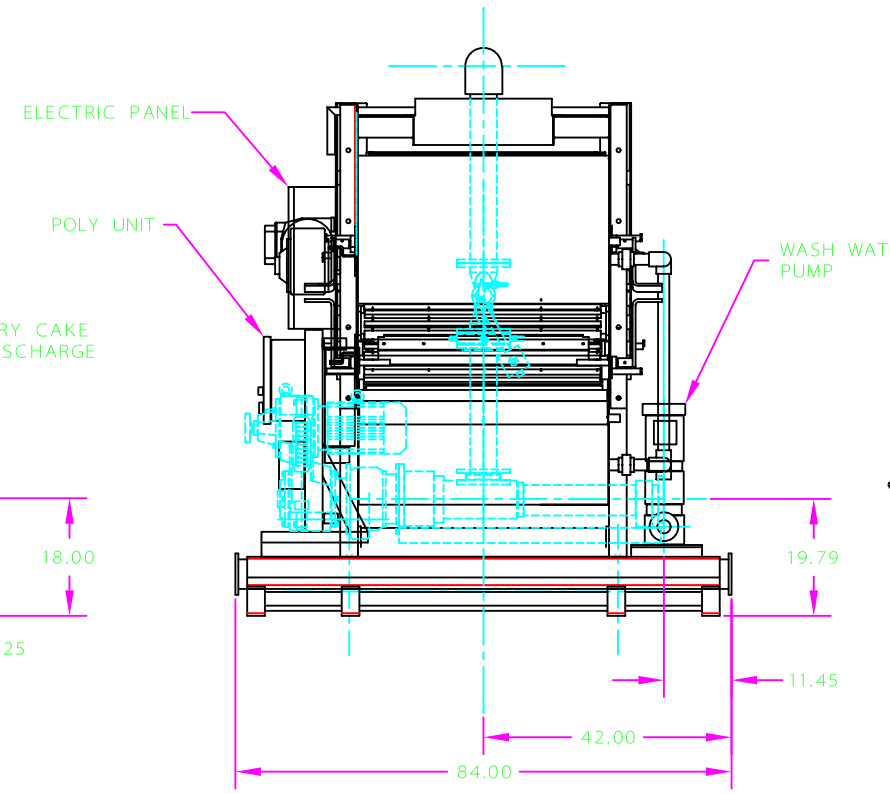
WASH WATER
1 1/4" 15 GPM

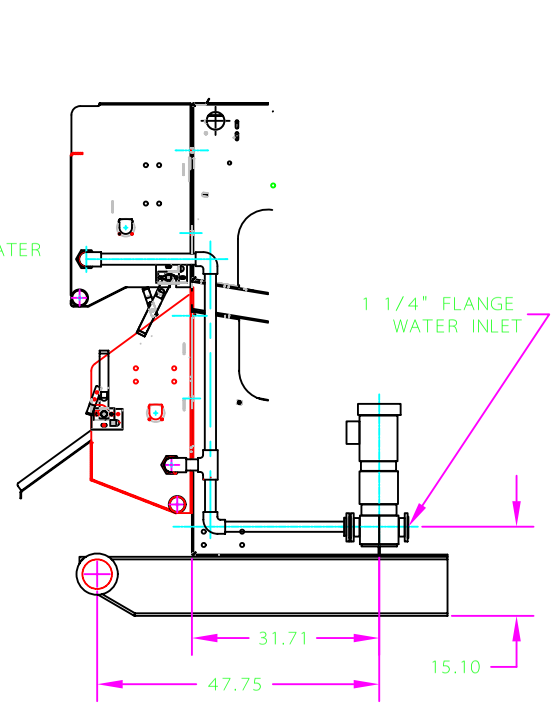
POLY DILUTION WATER
1" 1 GAL/HR (POTABLE)

SLUDGE PUMP
3" 150# RF FLANGE

FILTRATE DRAINS
4" NPT ONE EACH SIDE







NOTE:
THIS DRAWING NOT INTENDED FOR MANUFACTURING OR BUILDING USE.

SEE DRAWING SK001617 FOR DETAILS AND DIMENSIONS OF THE PRESS.

REVISIONS

REV	DATE	DESCRIPTION	BY	APPR
1	5/99	CORRECTED SKID DESIGN, & PLACEMENTS.	JS	JET
2	10/99	CORRECTED DIMS., SEE ECN	JET	JET
3	10/99	ADDED SEW EURODRIVE TO TITLE	JET	JET
4	2/02	ADDED NEW DRIVE AND GEARBOX.	JS	JET
5	2/02	ADDED NEW CONTROL PANEL	JS	JET
6	6/02	ADDED MANUFACTURING NOTE	MM	JET

TOLERANCE UNLESS NOTED:
ALL DIMENSIONS IN INCHES.
BREAK ALL SHARP EDGES
FRACTIONAL = ± 1/32"
ANGLES = ± 1/2°
DECIMAL .XX = ± .03
.X = ± .1, .XXX = ± .015
MACH. SURFACE 125 MAX.

DRAWN: JET	DATE: 11/11/98
CHECKED: JET	DATE: 11/11/98
APPROVED: JET	DATE: 11/11/98
NEXT ASSY: N/A	WEIGHT: 10,600 lb

ASHBROOK
LEADERS IN LIQUID / SOLID SEPARATION

Ashbrook Corporation
11600 East Hardy Road
Houston, Texas 77093
Phone: 281-449-0322
FAX: 281-449-1324

TITLE
GENERAL ARRANGEMENT
KLAMPRESS KP0.5
SKID PACKAGE

SCALE	DWG. NO.	REV
1/32	SK001689	6

CUSTOMER: N/A

CLOVEWOOD

Draft Environmental Impact Statement

I-2
Waste Assimilation and Capacity (WAC) Report

Community Planning Consultants
CPC
P.O. Box 2020, Monroe New York 10949
Tel: (845) 774 · 8000 | cpcnynj@gmail.com

From: **Kirk Rother** <krother@kirkrother.com>
Date: Tue, Dec 2, 2014 at 9:34 AM
Subject: Fw: Clovewood Preliminary Stream Effluent Limits
To: Gelb Simon <gelbsimon@gmail.com>, Cleary Joseph <Joseph.Cleary@hdrinc.com>, Munoz Kristin <Kristin.Munoz@hdrinc.com>

Good Morning Simon and Krissy,

Below are the preliminary effluent limits for the Clovewood project as provided by the DEC.

Kirk

From: Roy, Aparna (DEC)
Sent: Monday, December 01, 2014 10:45 AM
To: Kirk Rother
Subject: RE: Preliminary Stream Effluent Limits

Hi Kirk: The preliminary effluent limits for both Options (Option 1 and Option 2) are:

BOD: 5 mg/l
TSS: 10 mg/l
pH: 6.5-8.5
Fecal Coliform: 200/400
DO: 7 mg/l
SS: 0.1 ml/l
Phosphorous: 0.5 mg/l
Ammonia (summer/winter): 1.5 mg/l/2.2 mg/l
TRC: 0.02 mg/l

Thanks
Aparna

January 19, 2015

John W Petronella
NYSDEC Region 3 Headquarters
21 South Putt Corners Rd
New Paltz, NY 12561
(845)256-3054

Dear Mr. Petronella,

Henningson, Durham & Richardson Architecture and Engineering, P.C. (HDR) has completed an initial Waste Assimilation Capacity (WAC) analysis in accordance with NYSDEC Division of Water Technical and Operational Guidance (TOGS) 1.3.5 for two sites for the proposed discharge from a new wastewater treatment facility (WWTF) to serve the Clovewood development in Orange County, New York. A wastewater flow of 420,000 gpd is anticipated. The location of the Clovewood development and potential WWTF discharge locations are shown on the attached Figure 1. Site 1 is an unnamed tributary to Satterly Creek and Site 2 discharges directly to Satterly Creek, both within the Village of South Blooming Grove, NY, Orange County. Satterly Creek is a Class C water and is tributary to Moodna Creek, an eventual tributary to the Hudson River. Protection of the uses of Satterly Creek as a Class C stream requires a high level of wastewater treatment. As the selected treatment will include nitrification thus reducing oxygen demand from ammonia discharges, CBOD is the primary source of oxygen demand. Site 1, which is the unnamed tributary to Satterly Creek, is on the Clovewood site and is 200 feet upstream of a nearby commercial property line.

The proposed location on Satterly Creek is approximately 600 feet downstream of Merriewold Lake. These locations are in agreement with New York State Design Standards distances to downstream dwellings or properties[1,2]. Site 1 and Site 2 are shown in Figure 1. The WAC Analysis was performed using conservative assumptions and the calculations are attached.

The main conclusions of the analysis are listed below and the recommended effluent limits for Sites 1 and 2 for the Clovewood site are summarized below:

1. A flow analysis indicates that Site 1 is an intermittent stream and would therefore require Intermittent Stream Effluent Limits (ISEL). NYS ISELs are presented in Table 1.

[1] New York State Design Standards for Intermediate Sized Wastewater Treatment Systems. March 2014. New York State Department of Environmental Conservation Division of Water 625 Broadway Albany, New York 12233-3505
[2] NYS Design Standards recommend minimum aerial separation distances from a treatment facility of 200 feet radial distance to existing downwind dwellings and 150 feet distance to property line from the treatment unit. These distances pertain to wastewater treatment processes enclosed in a building, and buried or covered sand filters, which are anticipated for this project.

Table 1. Site 1 - Intermittent Stream Effluent Limits (ISEL)

Parameter	ISEL Limit
$CBOD_5$	5 mg/L
TSS	10 mg/L
pH	6.5 – 8.5
Fecal Coliform	200/400
DO	7 mg/l
Settleable Solids (SS)	0.1 ml/l
Phosphorus	0.5 mg/l
Ammonia (summer/winter):	1.5 mg/l/2.2 mg/l

2. A flow analysis for Site 2 indicates that the MA7CD10 is on the order of 0.13 cfs. The following analyses therefore pertain to Site 2.

3. It is anticipated that the WWTF will employ nitrification to an ammonia discharge level of 1.5 mg/L. Organic nitrogen will essentially be removed during nitrification. These levels are consistent with ISELs for ammonia.

4. A determination of required effluent concentrations for CBOD for varying dissolved oxygen (DO) effluent concentrations was completed. Results are tabulated in Part D and are graphically shown on Figure 2. The analysis was made after applying the anticipated ammonia level of 1.5 mg/l since the plant will employ nitrification. A conservative estimate of organic nitrogen at 0.5 mg/l is also applied. This is conservative because the organic nitrogen would be converted as part of the nitrification process. Post-aeration is anticipated and a sensitivity analysis for DO effluent levels of 5.0 mg/l, 6.0 mg/l and 7.0 mg/l was completed. The analysis indicates that Satterly Creek can assimilate a $CBOD_5$ of 8 mg/l at an effluent DO of 5 mgl, a $CBOD_5$ of 9 mg/l at an effluent DO effluent of 6 mg/L and a $CBOD_5$ of 9.7 mg/l at an effluent DO of 7 mg/L.

5. Phosphorus removal to a discharge concentration of 0.5 mg/L is anticipated for both Site 1 and Site 2. This is consistent with NYS year-round, 30 day average, TOGS 1.3.6, Phosphorus Removal Requirements for Wastewater Discharges to Lakes & Lake Watersheds. Satterly Creek is approximately 1 mile upstream of an unnamed impoundment on Satterly Creek.

6. A Total Residual Chlorine (TRC) limit is not needed since UV disinfection is anticipated for the WWTF.

7. A summary of the recommended effluent limits for Site 2 is presented in Table 2

Table 2. Site 2 Proposed Effluent Limits

Parameter	Limit
$CBOD_5$	8 mg/L
TSS	10 mg/L
pH	6.5 – 8.5
Fecal Coliform	200/400
DO	5 mg/l
Settleable Solids (SS)	0.1 ml/l
Phosphorous	0.5 mg/l
Ammonia (summer/winter):	1.5 mg/l /2.2 mg/l

The Clovewood development project team looks forward to the guidance provided by DEC on this project. We are looking forward to reviewing the recommended effluent limits and attached calculations with DEC to finalize the design parameters for the wastewater treatment facility. Also a request to connect to the Orange County sewer system as a potential alternative under evaluation was made by Kirk Rother, PE. If you have any questions, please feel free to contact Laurie De Rosa (Laurie.DeRosa@hdrinc.com, 201.335.9354) or myself (Kristin.Munoz@hdrinc.com, 201.335.9410). Thank you again for your consideration.

Sincerely,

Henningson, Durham & Richardson
Architecture and Engineering, P.C.

Kristin M. Munoz, PE

cc: Simon Gelb (CPC)
Joseph Cleary, PE (HDR)
Laurie De Rosa (HDR)

Waste Assimilation Capacity (WAC) Analysis:

Proposed Clovewood WWTP discharge to Unnamed Creek and Satterly Creek, South Blooming Grove, NY

From New York State Department of Environmental Conservation (DEC) Guidance

A. Receiving Stream Characteristics

1. Receiving water being investigated in the following streams as shown in Figure 1:

Unnamed Creek upstream of the confluence of Satterly Creek

Waters Index Number: Requested from DEP in email to A. Roy on 12/16/2014

Class: None

Standards: Tributary to Satterly Creek with standard of C applied.

Satterly Creek downstream of Merriewold Lake

Waters Index Number: Requested from DEP in email to A. Roy on 12/16/2014

Class: C, Nontrout (assumed - requested from DEP in email to A. Roy on 12/16/2014)

Standards: C

2. Statistical minimum average seven consecutive day streamflow occurring once in ten years (MA7CD10).

The USGS/DEC Bulletin 74 lists three streams location near the study area

- Trout Brook near Walton Park, USGS 01373580, Drainage Area (DA)=2.39 mi^2, MA7CD10 = 0.2 cfs, MA7CD2 = 0.3 cfs, MA7CD10=0.0837 cfs/mi2.
- Woodbury Creek at Mountainville, USGS 01373800, Drainage Area (DA)=21.9 mi^2, MA7CD 10 = 1.6 cfs, MA7CD 2 = 2.7 cfs, MA7CD 10= 0.0357 cfs/mi2
- Woodbury Creek near Highland Mills, USGS 01373690, Drainage Area (DA)=11.2 mi2, MA7CD 10 = 0.4 cfs, MA7CD 2 = 1.1 cfs, MA7CD 10= 0.0731 cfs/mi^2

The proposed WWTP discharge site to the Unnamed Creek upstream of the confluence with Satterly Creek, Drainage Area (DA) = 0.45 mi^2, MA7CD 10 = 0.016 cfs [0.45 mi^2 X 0.0357 cfs/mi^2 (from Woodbury Creek at Mountainville)].

The proposed WWTP discharge site to Satterly Creek downstream of the Merriewold Lake, Drainage Area (DA) = 3.62 mi^2, MA7CD 10 = 0.129 cfs [3.62 mi^2 X 0.0357 cfs/mi^2 (from Woodbury Creek at Mountainville)].

3. Unnamed Creek with 7Q10 flow of 0.016 cfs (0.010 MGD) is an Intermittent Stream. Satterly Creek with 7Q10 flow of 0.129 cfs (0.084 MGD) is not an Intermittent Stream.

Since the unnamed Creek is an intermittent stream it is subject to Intermittent Stream Effluent Limits (ISEL). The following analysis is therefore being completed for Satterly Creek.

B. Receiving Waters Design Parameters

1. Dissolved oxygen saturation: 8.3 mg/L (435 ft, 25 ^{o}C, Class C, Nontrout)
Upstream DO: 7.47 mg/L (90% of saturation)

2. Temperature: 25 ^{o}C (Class C, Nontrout)

3. Upstream total oxygen demand (TOD): 3.0 mg/L

4. Self purification factor (f): 3.0-5.0; Satterly Creek is a swift stream based on visual field inspection (site visit 12/3/2014). Conservative f applied = 3

5. K_1 (BOD bottle rate of decay): 0.23/day

6. K_1 (base 10): 0.1 /day

7. Stream nitrification rate, K_n is the same as the BOD decay rate, 0.23/day

8. K_2, reaeration rate = 0.69/day for f = 3.

C. Wastewater Characteristics

1. The wastewater will be domestic flow. Figure 2 presents $CBOD_5$ effluent limits of 8.0 mg/L, 9.0 mg/L and 9.7 mg/L for effluent DO discharges of 5 mg/L, 6 mg/L and 7 mg/L, respectively. These limits assume an ultimate to five day ratio of 1.5.

2. It is anticipated that the plant will employ nitrification to an ammonia discharge level of 1.5 mg/L. Organic nitrogen will essentially be removed during nitrification and any remaining organic nitrogen will likely be refractory. Therefore an organic nitrogen discharge of 0.5 mg/L is assumed. The ultimate nitrogen oxygen demand (NOD) is 9.14 mg/L [(1.5 mg/L ammonia + 0.5 mg/L organic nitrogen) * 4.57 mg DO/mg N].

3. At this time we are anticipating an effluent DO of 5.0 mg/L, an ultimate oxygen demand, $CBOD_u$ of 12 mg/L ($CBOD_5$ = 8.0 mg/L), and an ultimate nitrogenous oxygen demand of 9.14 mg/L. For the 0.42 MGD design flow, TOD effluent load is 74.1 lbs/day.

4. Post-aeration of the effluent is not needed. (See WAC Analysis – Oxygen Demand)

5. Although Satterly Creek is Class C, disinfection via ultra-violet (UV) will be provided. Therefore a total chlorine residual (TRC) limit is not needed.

D. Computation of Waste Assimilation Capacity and Wastewater Treatment Requirements.

1. Satterly Creek is not a regulated stream.

2. WAC Analysis:

Stream DO Saturation, Cs (mg/L) =	8.30
Stream DO Deficit u/s of WWTP, Ds (mg/L) =	0.83
DO u/s of WWTP, DOs (mg/L) =	7.47
Stream Flow u/s of the WWTP, Qs (MGD) =	0.083
Stream Standard, DO (mg/L) =	4
Upstream Total Oxygen Demand (mg/L) =	3
"f" factor for Swift Streams (3.0 - 5.0)	3

Effluent DO, (mg/L)	Effluent Flow from WWTP, Q_w (MGD)	Effluent Deficit, D_w (mg/L)	Critical Deficit, D_c (mg/L)	Initial Mixed DO Deficit, D_a (mg/L)	Waste Assimilitive Capapcity, L_a (mg/L TOD) From Graphs	Waste Assimilitive Capapcity, L_a (lb/day TOD)	Upstream, (lbs/day TOD)	Effluent NOD, (lbs/day)	Effluent $CBOD_u$, (lbs/day)	Effluent $CBOD_5$ (mg/L)
5	0.42	3.30	4.3	2.9	18.15	76.2	2.1	32.0	42.1	8.0
6	0.42	2.30	4.3	2.1	19.35	81.2	2.1	32.0	47.1	9.0
7	0.42	1.30	4.3	1.2	20.30	85.2	2.1	32.0	51.1	9.7
5	0.84	3.30	4.3	3.1	18.00	138.6	2.1	64.0	72.5	6.9
6	0.84	2.30	4.3	2.2	19.20	147.9	2.1	64.0	81.7	7.8
7	0.84	1.30	4.3	1.3	20.20	155.6	2.1	64.0	89.4	8.5
5	1.26	3.30	4.3	3.1	17.85	200.0	2.1	96.0	101.9	6.5
6	1.26	2.30	4.3	2.2	19.20	215.1	2.1	96.0	117.0	7.4
7	1.26	1.30	4.3	1.3	20.20	226.3	2.1	96.0	128.2	8.1

Figure 1. Clovewood WAC Analysis Study Areas.

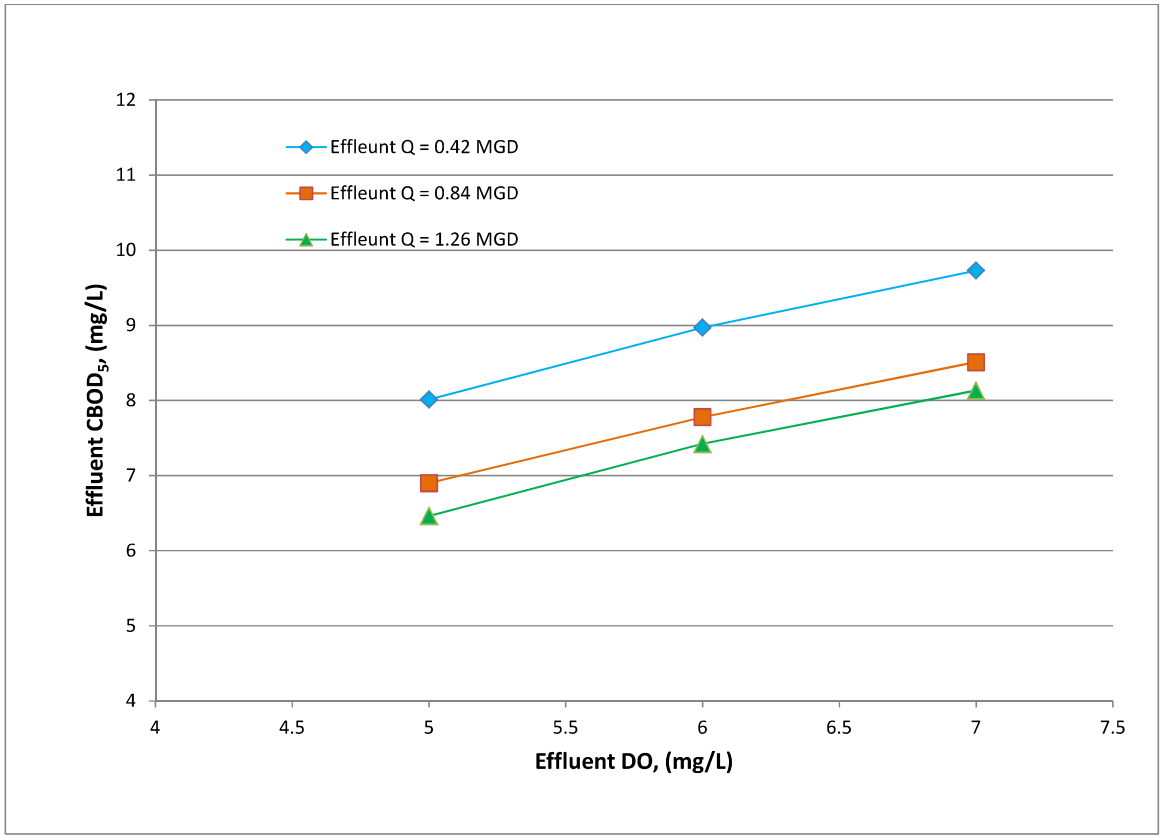


Figure 2. Clovewood Effluent DO Versus Effluent $CBOD_5$, Variable Flow.

------ Original message ------
From: "Petronella, John W (DEC)" <john.petronella@dec.ny.gov>
Date:04/08/2015 9:02 AM (GMT-05:00)
To: Kirk Rother <krother@kirkrother.com>, Kirk Rother <kirk@optonline.net>
Subject: FW: Clovewood Wastewater Treatment Facility, (V) South Blooming Grove

Good morning Kirk,

Please see below Preliminary Effluent limits for the Clovewood project. Please note that these are only preliminary limits and are not official. Official effluent limits can only be provided through a DRAFT SPDES permit. A DRAFT SPDES permit can only be released after the SPDES application and all other required DEC applications associated with the site have been submitted and deemed complete per Uniform Procedures Act (UPA) and SEQR has been satisfied.

Please forward these limits onto Simon as I cannot locate his e-mail.

Regards,

John W. Petronella

Deputy Regional Permit Administrator, Division of Environmental Permits
New York State Department of Environmental Conservation
21 South Putt Corners Rd, New Paltz, NY 12561
P: (845) 256-3041 | F: (256) 255-4659 | john.petronella@dec.ny.gov
www.dec.ny.gov | cic | cic

From: Adewole, Adedayo J (DEC)
Sent: Wednesday, April 08, 2015 8:44 AM
To: Petronella, John W (DEC)
Subject: Clovewood Wastewater Treatment Facility, (V) South Blooming Grove

John,

Either location requires intermittent effluent stream limits. The receiving water are both Class C and no disinfection required at either.

Outfall 001: 41° 22' 43" 74° 10'18"
Receiving water - Satterly Creek, Class C, WIN: H-89-17

Outfall 002: 41° 22' 39" 74° 11'03"
Receiving water - Tributary to Satterly Creek, Class C, WIN: H-89-17-4

BOD	5.0 mg/l (DM)
TSS	10 mg/l (DM)
SS	0.1 ml/l (DM)
DO	7.0 mg/l (daily min)
NH3 (as N, summer)	1.5 mg/l
NH3 (as N, winter)	2.2 mg/l
pH	6.5 – 8.5 SU

Dayo Adewole, P.E.

Environmental Engineer 1, Division of Water
New York State Department of Environmental Conservation
100 Hillside Avenue, Suite 1W, White Plains, NY 10603
P: (914) 428-2505 | F: (914) 428-0323 | adedayo.adewole@dec.ny.gov
www.dec.ny.gov | cic | cic

CLOVEWOOD

Draft Environmental Impact Statement

I-3
Clovewood Transportation Corporation

P.O. Box 2020, Monroe New York 10949
Tel: (845) 774 · 8000 | cpcnynj@gmail.com

CERTIFICATE OF INCORPORATION
OF
CLOVEWOOD TRANSPORTATION CORPORATION

A SEWAGE-WORKS CORPORATION

PURSUANT TO ARTICLE 1, SECTION 3 AND
ARTICLE 10 OF THE TRANSPORTATION
CORPORATIONS LAW OF THE STATE OF NEW YORK

I, the undersigned, for the purpose of forming a sewage-works corporation pursuant to Article 1, Section 3 and Article 10 of the Transportation Corporations Law of the State of New York, hereby certify:

FIRST: The name of the proposed corporation is:

CLOVEWOOD TRANSPORTATION CORPORATION

SECOND: The purposes for which the within sewage-works corporation is formed are to provide for the disposal, treatment and removal of sewage and to operate, maintain, keep and repair its sewage disposal plant and appurtenances thereto associated with the Clovewood residential development of 600 lots, located on property within the Village of South Blooming Grove, Town of Blooming Grove, County of Orange and State of New York, and in connection with said development to lay, maintain, repair and operate such facilities in any street, highway or public place of any city, town, village or other municipal area, in which it has obtained the consent required by Article 10, Section 116 of the Transportation Corporations Law and to perform all other permitted activities under Article 1, Section 3 and Article 10 of the Transportation Corporations Law.

THIRD: The aggregate number of shares which the Corporation shall have the authority to issue is 200 shares of no par value stock.

FOURTH: The office of the Corporation is to be located in Orange County.

FIFTH: The Secretary of State is designated as agent of the Corporation upon whom process against it may be served. The post office address to which the Secretary of State shall mail a copy of any process against the Corporation served upon him is: Keen Equities LLC, C/O Yehoshua Rubin 4922 11th Avenue, Brooklyn, NY 11219

SIXTH: The undersigned incorporator is of the age of twenty-one years or over:

YEHOSHUA RUBIN

SEVENTH: This Corporation shall be empowered to engage in any similar lawful business or enterprise which is or might be incidental to, and in any manner connected with its primary purposes.

EIGHTH: The area to be supplied with sewer services by the Corporation is the Clovewood residential development, located solely in the Village of South Blooming Grove, Town of Blooming Grove, County of Orange, State of New York and the Consent of the Village Board of the Village of South Blooming Grove, as required by Article 10, Section 116 of the Transportation Corporations Law, has been obtained and is annexed hereto.

NINTH: No holder of any of the shares of any class of the Corporation shall be entitled as of right to subscribe for, purchase, or otherwise acquire any shares of any class of the Corporation which the Corporation proposes to issue, or any rights or options which the Corporation proposes to grant for the purchase of shares of any class of the Corporation or for the purchase of any shares, bonds, securities, or obligations of the Corporation which are convertible into or exchangeable for, or which carry any rights to subscribe for, purchase or otherwise acquire shares of any class of the Corporation; and any and all of such shares, bonds, securities or obligations of the Corporation, whether now or hereafter authorized or created, may be issued, or may be reissued or transferred if the same have been reacquired and have treasury status, and any and all of such rights and options may be granted by the Board of Directors to such persons, firms, corporations and associations, and for such lawful consideration and on such terms, as the Board of Directors in its discretion may determine, without first offering the same, or any thereof, to any said holder. Without limiting the generality of the foregoing stated denial of any and all preemptive rights, no holder of shares of any class of the Corporation shall have any preemptive rights in respect of the matters, proceedings, or transaction specified in Article 6, Section 622, paragraph (e), subparagraphs (1) to (6) inclusive of the Business Corporation Law.

TENTH: Except as may otherwise be specifically provided in this Certificate of Incorporation, no provision of this Certificate of Incorporation is intended by the Corporation to be construed as limiting, prohibiting, denying, or abrogating any of the general or specific powers or rights conferred under the Transportation Corporations Law or, by virtue of Article 1, Section 3 and Article 10 thereof, the Business Corporation Law upon the Corporation, upon its shareholders, bondholders, and security holders, and upon its directors, officers and other corporate personnel including, in particular, the power of the Corporation to furnish indemnification to directors and officers in the capacities defined and prescribed by the Business Corporation Law, and the defined and prescribed rights of said persons to indemnification as the same are conferred by the Business Corporation Law.

ELEVENTH: Annexed hereto is a certificate, duly executed on behalf of the local governing body of the Village of South Blooming Grove, the Incorporated Village in which all of the sewage-works system provided by this Corporation is situated, consenting to the formation of this Corporation.

IN WITNESS WHEREOF, this Certificate has been signed this 18th day of May, 2018.

Yehoshua Rubin

State of New York, County of KINGS ss.:

On the of May 18 2018 in the year 2018 before me, the undersigned personally appeared YEHOSHUA RUBIN, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity, and that by his signature on the instrument the individual, or the person upon whose behalf the individual acted, executed the instrument.

Notary Public

YENTY RUBIN
Notary Public State of New York
No. 01RU6080784
Qualified in Kings County
Commission Expires September, 23, 2020

CERTIFICATE OF CONSENT
TO FORMATION OF THE
CLOVEWOOD TRANSPORTATION CORPORATION

I, JAMES LOFRANCO, Mayor of the Village of South Blooming Grove, pursuant to Resolution of the Village Board of Village of South Blooming Grove adopted on _____, , hereby certifies that the Village Board of the Village of South Blooming Grove has consented to the formation of the CLOVEWOOD TRANSPORTATION CORPORATION, a sewage-works corporation under the provisions of Article 1, Section 3 and Article 10 of the Transportation Corporations Law of the State of New York for the purpose of servicing the Village of South Blooming Grove with a sewage system effective at such time as the New York State Department of Environmental Conservation issues the requisite permit and approves the maps and certifications of the proposed sewer system or issues notice of its intent to grant such approval, and consent to the filing of the annexed Certificate of Incorporation of the Clovewood Transportation Corporation.

James LoFranco, Mayor
Village of South Blooming Grove

State of New York, County of Orange ss.:

On the _____ of _____ in the year 2018 before me, the undersigned personally appeared JAMES LOFRANCO personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his capacity, and that by his signature on the instrument the individual, or the person upon whose behalf the individual acted, executed the instrument.

Notary Public

VILLAGE OF SOUTH BLOOMING GROVE
MAY 23 2018
RECEIVED

CLOVEWOOD

Draft Environmental Impact Statement

I-4
NYSDEC Correspondence

Community Planning Consultants
CPC
P.O. Box 2020, Monroe New York 10949
Tel: (845) 774 · 8000 | cpcnynj@gmail.com

Attachment I-4(1)

Correspondence Dated 3/14/16

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 3
21 South Putt Corners Road, New Paltz, NY 12561-1620
P: (845) 256-3054 I F: (845) 255-4659
www.dec.ny.gov

March 14, 2016

Simon Gelb
P.O. Box 2020
Monroe, New York

Re: Clovewood
Village of South Blooming Grove, Orange County
DEC Application ID No. 3-3320-00150/00001
Notice of Incomplete Application

Dear Mr. Gelb:

The New York State Department of Environmental Conservation (DEC or Department) has reviewed the application materials you provided on behalf of Keen Equities, LLC. This information was received by this office on January 8, 2016. Specifically, an Application Form D for a State Pollutant Discharge Elimination System (SPDES) permit was submitted along with other associated information. According to the information provided, the proposed project is the construction of a 600 single family residential subdivision on 708 acres within the Village of South Blooming Grove. The proposed subdivision will construct an onsite sanitary wastewater treatment facility with a surface water discharge and a potable water supply system.

Department staff has determined the application is incomplete. Please address the following:

1. **State Environmental Quality Review (SEQR)**
   The Village of South Blooming Grove Planning Board coordinated for SEQR Lead Agency on December 30, 2015. Pursuant to Uniform Procedures (UPA) 621.3(a)(7), if the project is subject to the provisions of Article 8 of the Environmental Conservation Law (ECL) "SEQR", the Department cannot determine that an application is complete until a negative declaration has been prepared by the lead agency or a Draft Environmental Impact Statement (DEIS) has been accepted in the case of a positive declaration. By copy of this correspondence, the Department is alerting the Village of South Blooming Grove Planning Board as lead agency of the need for this determination. The application will remain incomplete until SEQR requirements have been satisfied.

Re: **Clovewood**
Village of South Blooming Grove, Orange County
DEC Application ID No. 3-3320-00150/00001
Notice of Incomplete Application

2. **Water Withdrawal – 6 CCR-NY Part 601**
According to the information provided, the proposed project will construct a new potable water supply system served by onsite groundwater wells. It is anticipated that the proposed project will require 420,000 gallons per day of water. Therefore, a Water Withdrawal permit will be required from the Department. Please submit a Water Withdrawal application for the proposed project.

3. **State Pollutant Discharge Elimination System (SPDES) – Waste Water**
    - Please provide a USGS quad map showing the final outfall location. The report provided included two different outfall locations. One outfall location needs to be provided in order to base the SPDES permit on.
    - Please provide a process flow diagram for the waste water treatment plant (WWTP).

4. **Article 11 – Threatened and Endangered Species Incidental Take Permit**
Staff have reviewed the Timber Rattlesnake Survey & Habitat Assessment ("Assessment") prepared by North Country Ecological Services, Inc. and dated August 18, 2015. Based upon review of the Assessment, staff consider the property within 1.5 miles of the den to be occupied habitat under Art 11 part 182. The areas outside of the basking/gestating habitats would be considered foraging habitat. Even with the large amount of open space depicted in the proposed plans, the development does enter into this foraging habitat and will result in the loss/take of this habitat as well as possible impact to individuals that could be found foraging in this area. Accordingly, an Article 11 Incidental Take permit will be required for the project as currently proposed.

    It should be noted that the areas labeled 'undeveloped area' extending from a cul de sac at the eastern portion of the subdivision that look like a future road are of the most concern as this would impact sensitive Timber rattlesnake habitats on the ridge. If this area is for a future proposed road, the plans should clearly indicate this so that its potential impacts can be fully evaluated.

    Regulations pertaining to Incidental Take permits can be found at the DEC website at: http://www.dec.ny.gov/regs/2494.html. Specific application requirements can be found under Part 182.11. Please submit an Incidental Take permit application for the proposed project.

Re: Clovewood
Village of South Blooming Grove, Orange County
DEC Application ID No. 3-3320-00150/00001
Notice of Incomplete Application

Uniform Procedures Act (UPA)

Please also be advised that per 6 CRR-NY Part 621.4f, this is considered a major project. Once the department considers the application complete, it will be required to undergo a 30 day public comment period. You as the applicant will be responsible for publishing the notice of Complete Application in the official newspaper of the town in which the project will occur. Any comments received must be addressed before a final permit decision is made.

Please note that if a project requires more than one department permit, the applicant must simultaneously submit all the necessary applications, or demonstrate to the department's satisfaction that there is good cause not to do so. In this case an Incidental Take Permit and a Water Withdrawal Permit are required in addition to the SPDES wastewater.

The application will remain incomplete until the above matters are addressed. If you have any comments or questions, or would like to discuss further, please feel free to contact me at (845) 256-3041.

Sincerely,

John W. Petronella
Deputy Regional Permit Administrator

Cc Village of South Blooming Grove, Planning Board Clerk

ECc Manju Cherian, Division of Water DEC R3
Lisa Masi, DEC R3

Attachment I-4(2)
Correspondence dated 6/28/16

Gmail

Gelb Simon <gelbsimon@gmail.com>

DEC Application ID No. 3-3320-00150/00001

Gelb Simon <gelbsimon@gmail.com> Tue, Jun 28, 2016 at 4:13 PM
To: "Petronella, John W (DEC)" <john.petronella@dec.ny.gov>

Good Afternoon John,

A WAC Analysis was recently completed for the Clovewood project in accordance with NYSDEC's Division of Water Technical and Operational Guidance (TOGS) 1.3.5 for the potential discharge location from the proposed Clovewood WWTP.

The conservative flow analysis completed as part of the WAC Analysis indicated that the unnamed tributary is an intermittent stream and would therefore be required to achieve Intermittent Stream Effluent Limits (ISEL) for the WWTP discharge. Preliminary ISELs were provided by you on 4/8/15.

In addition, we submitted to you a SPDES permit application on 1/8/16 and included results from the conservative desktop WAC Analysis for the Wastewater Disposal System for proposed Clovewood WWTP. On 3/14/16 you provided a Notice of Incomplete Application. Kindly see attached hereto response from our engineer (HDR) addressing *Item 3 SPDES Wastewater*.

Please confirm if this response satisfies requirements to evaluate water quantity and quality effects on the stream flow in Slattery Creek and the unnamed tributary or if additional field sampling and modeling (using QUAL2E model) is necessary?

Respectfully,

Simon Gelb, CPC

4.15.16 HDR-CPC.pdf
1514K

April 15, 2016

Mr. Simon Gelb
CPC Planning Services
P.O. Box 2020
Monroe, NY 10949

Re: Clovewood
Village of South Blooming Grove, Orange County
DEC Application ID No. 3-3320-00150/00001
Response to Notice of Incomplete Application – SPDES Wastewater

Dear Mr. Gelb,

The New York State Department of Environmental Conservation's (NYSDEC) Notice of Incomplete Application letter, dated March 14, 2016, identified the following items to be addressed under Section 3. State Pollution Discharge Elimination System (SPDES) Waste Water:

- Provide a USGS quad map showing the final outfall location. The report provided included two different outfall locations. One outfall location needs to be provided in order to base the SPDES permit on.
- Provide a process flow diagram for the wastewater treatment plant (WWTP).

In response to the NYSDEC request for additional information under Section 3. SPDES Waste Water, please find attached to this letter an updated USGS quad map identifying the proposed outfall location (Attachment 1). Additional details on the outfall location was provided in Section 3.1 of the Engineer's Report submitted with the SPDES permit application, prepared by HDR on November 24, 2015 and received by the NYSDEC on January 8, 2016. In addition, please find attached copies of the WWTP process flow diagram that were provided as Appendix A (Sheets G-01, G-02, G-03, G-04 and G-05) to the Engineer's Report submitted with the SPDES permit application.

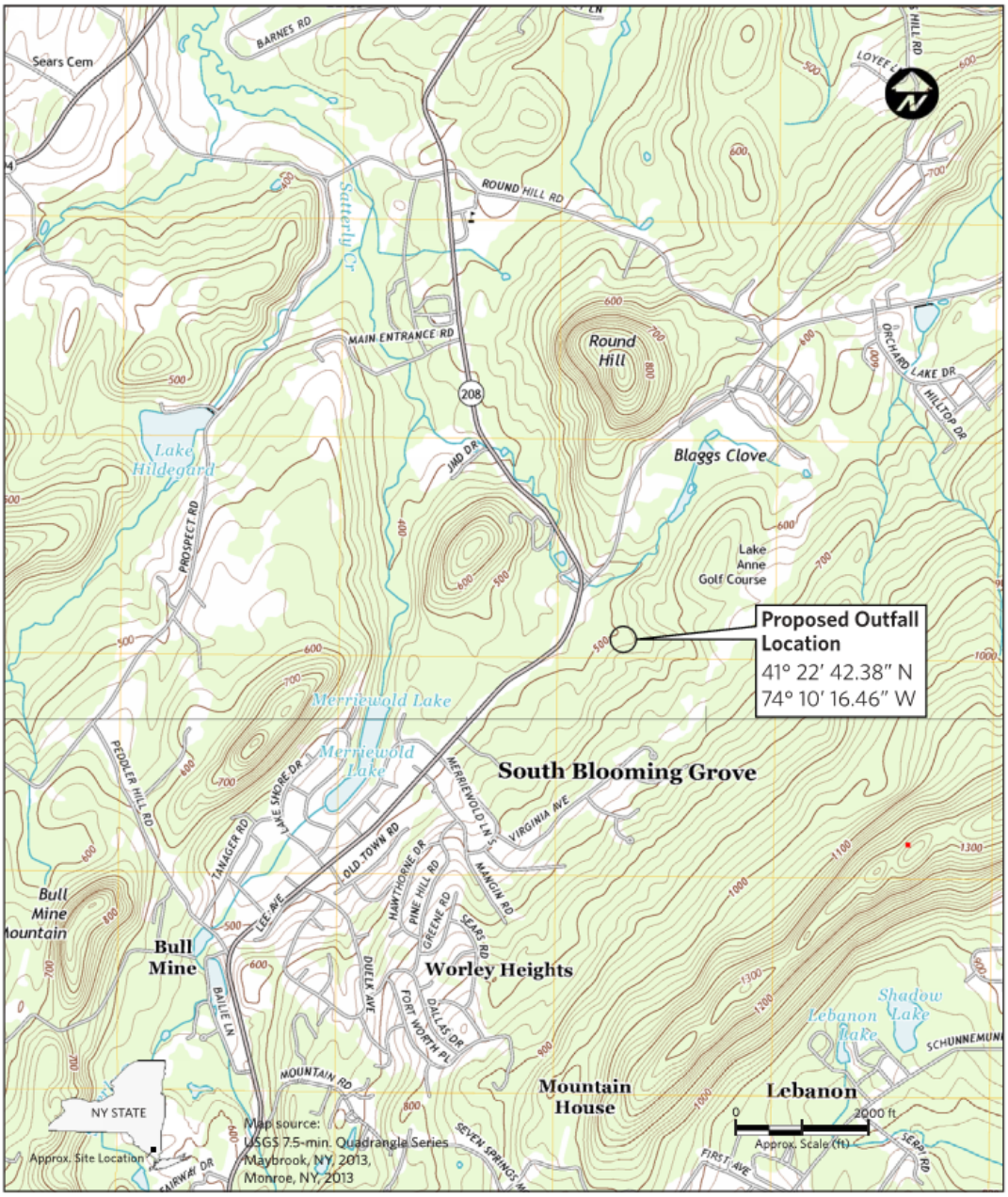
If you have any questions or need additional information, please feel free to contact me at 201-335-9410 or Kristin.Munoz@hdrinc.com.

Sincerely,

Henningson, Durham & Richardson
Architecture and Engineering, P.C.

Kristin M. Munoz, PE

ATTACHMENT 1



PROJECT TITLE: CLOVEWOOD WASTEWATER TREATMENT PLANT		PROJECT NUMBER: 244319	REFERENCE SHEET: -
SHEET TITLE: **PROPOSED OUTFALL LOCATION**		PROJECT MANAGER: K. MUNOZ	REFERENCE DOCUMENT: -
		DATE: 4/4/2016	EXHIBIT NUMBER: -

hdrinc.com

500 7th Avenue, 11th Floor, New York, NY 10018-4502
(212) 904-1212

ATTACHMENT 2

See Sheets G-01 through G-05 found in Appendix B of I-1

500 7th Avenue, 11th Floor, New York, NY 10018-4502
(212) 904-1212

Attachment I-4(3)

Correspondence Dated 5/25/18

New York State Department of Environmental Conservation
Division of Environmental Permits, Region 3
21 South Putt Corners Road, New Paltz, NY 12561
Phone: (845) 256-3054 • **FAX:** (845) 255-3042
Website: www.dec.ny.gov

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

May 25, 2018

Simon Gelb
CPC, LLC
P.O. Box 2020
Monroe, New York

RE: Clovewood
Village of South Blooming Grove, Orange County
DEC Application ID No. 3-3320-00150/00001,2,3
Notice of Incomplete Application

Dear Mr. Gelb,

The New York State Department of Environmental Conservation (DEC or Department) has reviewed the application materials you provided on behalf of Keen Equities, LLC. This information was received by this office on April 20, 2018, and included an application for an Article 15 Water Withdrawal permit; revised State Pollution Discharge Elimination System (SPDES) Permit Application; an Article 11 Incidental Take Permit Application; a draft Stormwater Pollution Prevention Plan (SWPPP); and other supporting materials.

Please note that the technical review of the submitted application is still underway, and therefore, additional requested items or information will be forthcoming.

However, as outlined in the Notice of Incomplete Application dated March 14, 2016 (enclosed), the application will remain incomplete until SEQR requirements have been satisfied.

Please remember that this application is still undergoing a technical review and additional technical comments will be forthcoming, however, the above mentioned items are needed in order for permit processing to continue.

If you have any questions you can contact me at 845-256-3059, or via e-mail at Tracey.Omalley@dec.ny.gov.

Sincerely,

Tracey O'Malley
Division of Environmental Permits

Encl. Notice of Incomplete Application, dated March 14, 2016

Cc. Village of South Blooming Grove, Planning Board Clerk

Ecc. Manju Cherian, Division of Water DEC R3
Aparna Roy, Division of Water DEC R3
Nate Ermer, Bureau of Wildlife DEC R3