scanned 8-13-20 original to Permits
Cover letter
COPY

TN Dept. of Env. & Conservation

AUG 05 2020

Division of Water Resources

rowenvironmental
Environmental Engineers and Scientists
145 Jefferson Pittsburg, Texas 75686
(903) 856-5133 FAX (903) 856-5134
email rowenvironmental@hotmail.com

July 30, 2020

Ms. Jessica Murphy
Manager, Compliance and Enforcement Unit
Division of Water Resources
TDEC
William R. Snodgrass – Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, TN 37243-1102

RE: SOP Application
Southeastern Provision LLC
Bean Station, Grainger County, TN 37708
WPC18-0030

Dear Ms. Murphy:

Per recent written and email correspondence from TDEC and in accordance with the revised CAP submitted in late June 2020 attached please find an application for a new SOP for construction of a new wastewater treatment system and drip dispersal system at Southeastern Provision. The new system will be designed to handle a future flow of up to 100,000 gallons per day and will consist of the following components:

- Anoxic Pretreatment Lagoon
- Cyclic Reactor Lagoon
- Aerobic Sludge Digestion Lagoon
- Effluent Storage Lagoon
- Drip Dispersal System

We are prepared to immediately begin the preparation of detailed plans and specifications upon receipt of authorization from TDEC.

Please advise if additional information is needed at this time.

Very truly yours,

Vernon D. Rowe, P.E.

Tennessee Department of Environment and Conservation
Division of Water Resources
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102
(615) 532-0625

APPLICATION FOR A STATE OPERATION PERMIT (SOP)

Type of application: ☑ New Permit ☐ Permit Reissuance ☐ Permit Modification

Permittee Identification: (Name of city, town, industry, corporation, individual, etc., applying, according to the provisions of Tennessee Code Annotated Section 69-3-108 and Regulations of the Tennessee Water Quality Control Board.)
Permittee Name (applicant): Southeastern Provision LLC
Permittee Address: 1617 Helton Road, Bean Station, TN 37708

Official Contact: Randy Hodge	Title or Position: Wastewater Manager		
Mailing Address: 1617 Helton Road	City: Bean Station	State: TN	Zip: 37708
Phone number(s): (865) 767-2300	E-mail: southeasternprovision@yahoo.com		

Optional Contact: William J. Gilger	Title or Position: Chief Operating Officer		
Address: 1617 Helton Road	City: Bean Station	State: TN	Zip: 37708
Phone number(s): (482) 350-1127	E-mail: wgilger@gmail.com		

Application Certification (must be signed in accordance with the requirements of Rule 0400-40-05-.05)		
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.		
Name and title; print or type: William J. Gilger, Chief Operating Officer	Signature: [signature]	Date: 7/30/2020

Permit Number: SOP-________

Facility Identification:	**Existing Permit No.**
Facility Name: Southeastern Provision LLC	County: Grainger
Facility Address or Location: 1617 Helton Road, Bean Station, TN 37708	Latitude: 36 deg 27 min 17 sec N Longitude: 83 deg 23 min 47 sec W

Name and distance to nearest receiving waters: Honey Creek Tributary to Cherokee Reservoir; 300 ft

If any other State or Federal Water/Wastewater Permits have been obtained for this site, list their permit numbers:

GRA0000013 (expired 5/11/2017); SOP 18010 (Pump and Haul)

Name of company or governmental entity that will operate the permitted system: Southeastern Provision LLC

Operator address: 1617 Helton Road, Bean Station, TN 37708

Has the owner/operator filed for a Certificate of Convenience & Necessity (CCN), or an amended CCN, with the Tennessee Regulatory Authority (TRA) (may be required for collection systems and land application treatment systems)? ☐ Yes ☐ No ☑ N/A

If the applicant listed above does not yet own the facility/site or if the applicant will not be the operator, explain how and when the ownership will be transferred or describe the contractual arrangement and renewal terms of the contract for operations.

not applicable

Complete the following information explaining the entity type, number of design units, and daily design wastewater flow:

Entity Type	Number of Design Units		Flow (gpd)
☐ City, town or county	No. of connections:		
☐ Subdivision	No. of homes:	Avg. No. bedrooms per home:	
☐ School	No. of students:	Size of cafeteria(s): No. of showers:	
☐ Apartment	No. of units:	No. units with Washer/Dryer hookups: No. units without W/D hookups:	
☐ Commercial Business	No. of employees:	Type of business:	
☐ Industry	No. of employees: 150	Product(s) manufactured: Beef	100,000
☐ Resort	No. of units:		
☐ Camp	No. of hookups:		
☐ RV Park	No. of hookups:	No. of dump stations:	
☐ Car Wash	No. of bays:		
☐ Other			

Describe the type and frequency of activities that result in wastewater generation.
Wastewater is generated from the processing of beef cattle and sanitation of the processing facility. Wastewater is generated continuously everyday during the processing and sanitation shifts. The plant operates 5 to 6 days per week.

Permit Number: SOP-________

Engineering Report (required for collection systems and/or land application treatment systems):	☐ N/A
☒ Prepared in accordance with Rule 0400-40-05-.03 and Section 1.2 of the State of Tennessee Design Criteria for Sewage Works ☑ Attached, or ☐ Previously submitted and entitled: Approved? ☐ Yes. Date: ☐ No Operation and Maintenance Inspection Schedule Submitted: Approved? ☐ Yes. Date: ☐ No	

Wastewater Collection System:	☑ N/A
System type (i.e., gravity, low pressure, vacuum, combination, etc.):	
System Description:	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.):	
In the event of a system failure describe means of operator notification:	
List the **emergency** contact(s) (name/phone):	
For low-pressure systems, who is responsible for maintenance of STEP/STEG tanks and pumps or grinder pumps (list all contact information)?	
Approximate length of sewer (excluding private service lateral):	
Number/hp of lift stations: / Number/hp of lift pumps /	
Number/volume of low pressure and or grinder pump tanks / Number/volume septic tanks /	
Attach a schematic of the collection system. ☐ Attached	
If this is a satellite sewer and you are tying in to another sewer system complete the following section, listing tie-in points to the sewer system and their location (attach additional sheets as necessary):	

Tie-in Point	Latitude (xx.xxxx°)	Longitude (xx.xxxx°)

Permit Number: SOP-________

Land Application Treatment System:	☐ N/A
Type of Land Application Treatment System: ☑ Drip ☐ Spray ☑ Other, explain:	
Type of treatment facility preceding land application (recirculating media filters, lagoons, other, etc.): Screening, flow equalization, dissolved air flotation, anoxic pretreatment lagoon, oxic/anoxic biological treatment lagoon, storage lagoon, filtration	
Attach a treatment schematic. ☑ Attached	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.): In the event of a power failure flow from the processing plant will stop. In the event of equipment failure that prevents or upsets treatment wastewater will be stored onsite. In the event of heavy rain that limits subsurface disposal wastewater will be stored onsite.	
For New or Modified Projects: Name of Developer for the project: Southeastern Provision LLC	
Developer address and phone number: 1617 Helton Road, Bean Station, TN 37708; (865) 767-2300	
For land application, list: Proposed acreage involved: 10.1 to 11.5 acres *see note below Inches/week gpd/sq.ft loading rate to be applied: 0.2 gpd/sqft	
Is wastewater disinfection proposed?	
☑ Yes Describe land application area access: FENCED WITH LOCKED GATE	
☐ No Describe how access to the land application area will be restricted:	

Attach required additional Engineering Report Information (see website for more information)

☑ Topographic map (1:24,000 scale presented at a six inch by six inch minimum size) showing the location of the project including quadrangle(s) name(s) GPS coordinates, and latitude and longitude in decimal degrees should also be included.

☑ Scaled layout of facility showing the following: lots, buildings, etc. being served, the wastewater collection system routes, the pretreatment system location, the proposed land application area(s), roads, property boundaries, and sensitive areas such as streams, lakes, springs, wells, wellhead protection areas, sinkholes and wetlands.

☑ Soils information for the proposed land disposal area in the form of a Water Resources Soils Map per Chapter 16 and 17 State of Tennessee Design Criteria for Sewage Work. The soils information should include soil depth (borings to a minimum of 4 feet or refusal) and soil profile description for each soil mapped.

☑ Topographic map of the area where the wastewater is to be land applied with no greater than ten foot contours presented at a minimum size of 24 inches by 24 inches.

☑ Describe alternative application methods based on the following priority rating: (1) connection to a municipal/public sewer system, (2) connection to a conventional subsurface disposal system as regulated by the Division of Groundwater Protection, and/or (3) land application.

(*) The facility currently has subsurface disposal areas consisting of 4,000 ft of LPP and 11,000 ft of chambers that were originally permitted and installed under expired Permit No. GRA0000013. An additional 5,000 feet of chamber was permitted but not installed. TDEC has expressed concern with continued use of the existing areas due to high hydraulic and organic loadings in the past. Southeastern Provision plans to work with TDEC to evaluate the existing subsurface disposal areas to determine if they can possibly be used in the future. If the existing subsurface disposal areas are determined to be usable they will be able to handle up to 12,000 gpd at a loading of 0.2 gal per day per sf. This will reduce the requirement for drip irrigation to 10.1 acres. If the existing subsurface areas can not be used in the future a drip system of up to 11.5 acres will have to be developed.

Permit Number: SOP-________

For Drip Dispersal Systems Only: Unless otherwise determined by the Department, sewage treatment effluent wells, i.e, large capacity treatment/drip dispersal systems after approval of the SOP Application, will be issued an UIC tracking number and will be authorized as Permit by Rule per UIC Rule 0400-45-06-.14(2) and upon issue of a State Operating Permit and Sewage System Construction Approval by the Department. Describe the following:	☐ N/A
The area of review (AOR) for each Drip Dispersal System shall, unless otherwise specified by the Department, consist of the area lying within a one mile radius or an area defined by using calculations under 0400-45-06-.09 of the Drip Dispersal System site or facility, and shall include, but not be limited to general surface geographic features, general subsurface geology, and general demographic and cultural features within the area. Attach to this part of the application a general characterization of the AOR, including the following: (This can be in narrative form)	
☑ A general description of all past and present groundwater uses as well as the general groundwater flow direction and general water quality.	
☑ A general description of the population and cultural development within the AOR (i.e. agricultural, commercial, residential or mixed)	
☑ Nature of injected fluid to include physical, chemical, biological or radiological characteristics.	
☑ If groundwater is used for drinking water within the area of review, then identify and locate on a topographic map all groundwater withdrawal points within the AOR, which supply public or private drinking water systems. Or supply map showing general location of publicly supplied water for the area (this can be obtained from the water provider)	
☑ If the proposed system is located within a wellhead protection area or source water protection area designated by Rule 0400-45-01-.34, show the boundary of the protection area on the facility site plan.	
☑ Description of system, Volume of injected fluid in gallons per day based upon design flow, including any monitoring wells	
☑ Nature and type of system, including installed dimensions of wells and construction materials	

Pump and Haul:	☑ N/A
Reason system cannot be served by public sewer:	
Distance to the nearest manhole where public sewer service is available:	
When sewer service will be available:	
Volume of holding tank: gal.	
Tennessee licensed septage hauler (attach copy of agreement):	
Facility accepting the septage (attach copy of acceptance letter):	
Latitude and Longitude (in decimal degrees) of approved manhole for discharge of septage:	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.):	

Permit Number: SOP-________

Holding Ponds (for non-domestic wastewater only):	☑ N/A
Pond use: ☐ Recirculation ☐ Sedimentation ☐ Cooling ☐ Other (describe):	
Describe pond use and operation:	
If the pond(s) are existing pond(s), what was the previous use?	
Have you prepared a plan to dispose of rainfall in excess of evaporation? ☐ Yes ☐ No	
If so, describe disposal plan:	
Is the pond ever dewatered? ☐ Yes ☐ No	
If so, describe the purpose for dewatering and procedures for disposal of wastewater and/or sludge:	
Is(are) the pond(s) aerated? ☐ Yes ☐ No	
Volume of pond(s): gal. Dimensions:	
Is the pond lined (Note if this is a new pond system it must be lined for SOP coverage. Otherwise, you must apply for an Underground Injection Control permit.)? ☐ Yes ☐ No	
Describe the liner material (if soil liner is used give the compaction specifications):	
Is there an emergency overflow structure? ☐ Yes ☐ No	
If so, provide a design drawing of structure.	
Are monitoring wells or lysimeters installed near or around the pond(s)? ☐ Yes ☐ No	
If so, provide location information and describe monitoring protocols (attach additional sheets as necessary):	

Permit Number: SOP-________

Mobile Wash Operations:	☑ N/A
☐ Individual Operator ☐ Fleet Operation Operator	

Indicate the type of equipment, vehicle, or structure to be washed during normal operations (check all that apply):

☐ Cars
☐ Trucks
☐ Trailers (Interior washing of dump-trailers, or tanks, is prohibited.)
☐ Other (describe):
☐ Parking Lot(s): sq. ft.
☐ Windows: sq. ft.
☐ Structures (describe):

Wash operations take place at (check all that apply):

☐ Car sales lot(s)
☐ Private industry lot(s)
☐ County(ies), list:
☐ Public parking lot(s)
☐ Private property(ies)
☐ Statewide

Wash equipment description:

☐ Truck mounted
☐ Rinse tank size(s) (gal.):
☐ Collection tank size(s) (gal.):
☐ Trailer mounted
☐ Mixed tanks size(s) (gal.):
Number of tanks per vehicle:

Pressure washer: psi (rated) gpm (rated)
☐ gas powered ☐ electric

Vacuum system manufacturer/model: Vacuum system capacity: inches Hg

Describe any other method or system used to contain and collect wastewater:

List the public sewer system where you are permitted or have written permission to discharge waste wash water (include a copy of the permit or permission letter):

Are chemicals pre-mixed, prior to arriving at wash location? ☐ Yes ☐ No

Describe all soaps, detergents, or other chemicals used in the wash operation (attach additional sheets as necessary):

Chemical name:	Manufacturer:	Primary CAS No. or Product No.

PRELIMINARY ENGINEERING REPORT

Preliminary Engineering Report
Proposed Process Wastewater Management System
Southeastern Provision LLC
Bean Station, Tennessee

PURPOSE AND NEED FOR THE PROPOSED PROJECT

Southeastern Provision LLC (SP) operates a beef processing plant in Bean Station, Tennessee. The existing wastewater management system for the facility consists of a physical/chemical pretreatment system followed by a subsurface disposal system (low pressure pipe and chambers). The existing system is incapable of adequately treating and disposing of the process wastewater generated by the processing plant. As a result of the inadequacy of the existing system the Tennessee Department of Environment and Conservation (TDEC) has ordered SP to cease using the existing subsurface disposal system and issued a temporary State Operating Permit (SOP No. 18010) to pump and haul process wastewater offsite to a permitted facility for handling. Additionally, TDEC has issued a Consent Order requiring SP to develop a Corrective Action Plan (CAP) to apply for a new SOP to allow upgrading of the wastewater treatment system and subsurface disposal system to comply with TDEC requirements. The proposed project is needed to comply with TDEC directives and assure the long term sustainability of the SP processing plant.

DESCRIPTION OF EXISTING SYSTEM

Figure No. 1 provides a flow schematic of the existing wastewater treatment system and subsurface disposal system. The system consists of the following components:

- Primary Screen
- Transfer Pumps
- Secondary Screen
- Aerated Equalization Basin
- Dissolved Air Flotation (DAF) Feed Pumps
- Floc Tube
- Dissolved Air Flotation (DAF) unit with Primary Coagulant (metal salt) and Polymer (anionic) Feed Systems
- Effluent Storage Tanks
- Subsurface Disposal System Dosing Pumps
- Sock Filters
- Subsurface Disposal System
- DAF Skimmings Storage Tank
- DAF Skimmings Pumps

Table No. 1 provides a summary of the existing treatment components and treatment capacities.

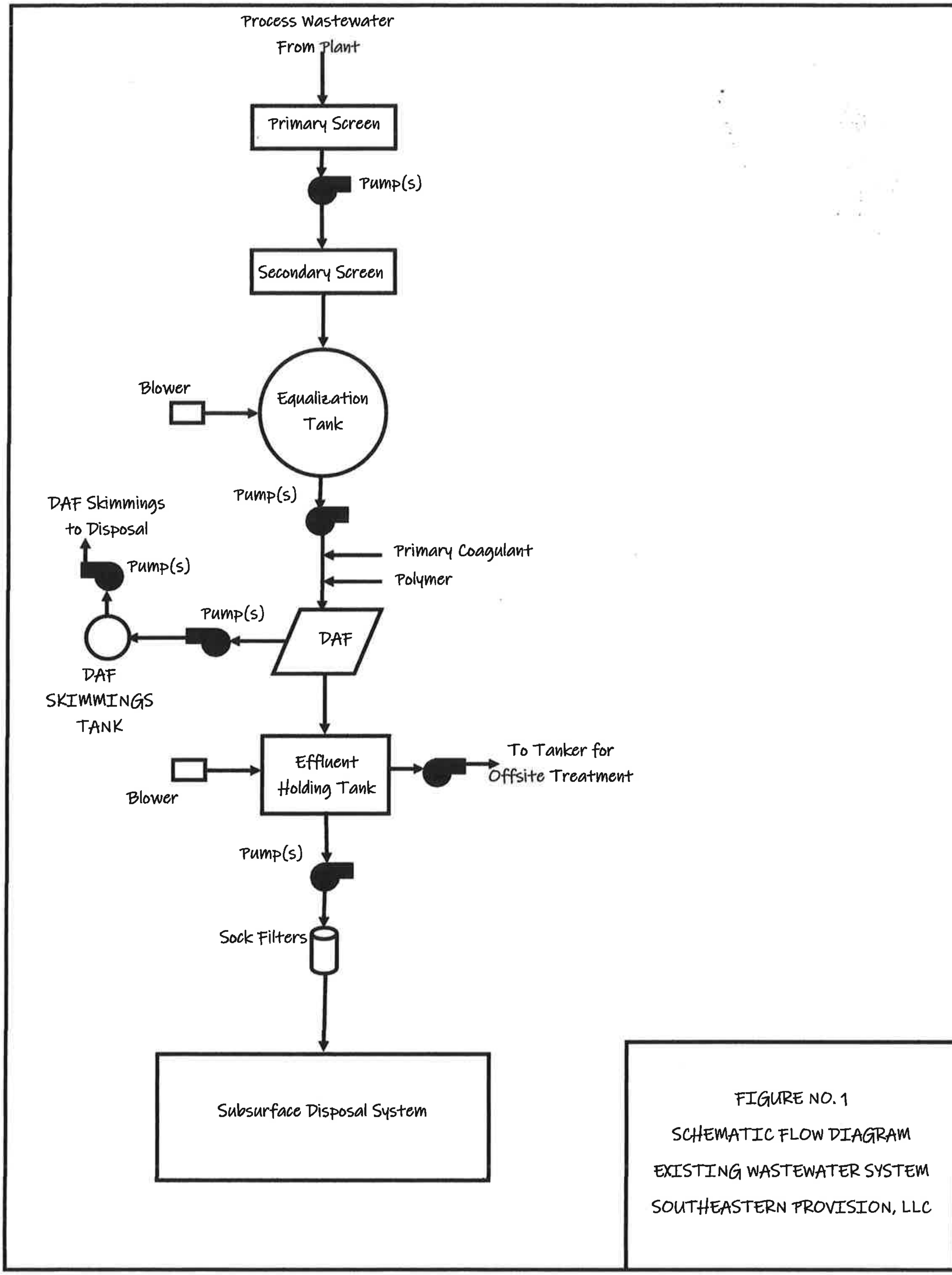


FIGURE NO. 1
SCHEMATIC FLOW DIAGRAM
EXISTING WASTEWATER SYSTEM
SOUTHEASTERN PROVISION, LLC

Table No. 1
Existing Wastewater Treatment System Components

Component	Description	Capacity
Primary Screen	24" by 72" Hycor Rotary Drum Screen	400 gpm
Transfer Pumps	Two Summit Self Priming Centrifugal Pumps; 3 by 3; 15 hp; 1800 rpm	250 gpm
Secondary Screen	72" Parabolic Screen	600 gpm
Equalization Tank	70,000 gallon Circular Concrete Basin with diffused aeration; dual 5 hp PD Blowers	16.8 hours detention time at peak flow of 100,000 gpd
DAF Feed Pumps	Two Durco Centrifugal Pumps; 3 by 2; 15 hp; 3600 rpm; VFD's	250 gpm
DAF Floc Tube	4" Diam; 75 ft long	250 gpm
DAF Unit	Stork; 13' by 6' by 6'; recycle pressurization; 3' by 6' sludge hopper	250 gpm
Effluent Storage Tanks	50,000 gallon Multi-compartment concrete tank with diffused aeration	12 hours detention time at peak flow of 100,000 gpd
Subsurface Disposal System Dosing Pumps	Two Durco Centrigufal; 3 x 2; 15 hp; 3600 rpm	250 gpm
Sock Filters	Pall Filters; Dual 50 micron plus Dual 25 micron in series	250 gpm
Subsurface Disposal System (currently out of service due to excessive hydraulic and organic loadings)	4,000 ft of Low Pressure Pipe; 11,000 ft of Chamber installed; 5,000 ft of chamber approved but not installed	The subsurface disposal system hydraulic loading rate is limited to 0.2 gpd/sf to assure Nitrate Nitrogen requirements are met. Trenches are 3 ft wide resulting in a total application area of 60,000 sf. Hydraulic loading capacity is limited to 12,000 gpd.
DAF Skimmings Storage Tank	5,000 gallon circular tank	2.5 days detention time at peak flow of 100,000 gallons per day

The projected peak flow to be treated by the existing components is 100,000 gallons per day. This flow can occur over a 16 hour time period resulting in an hourly flow of 6,250 gallons per hour, or 104 gallons per minute. Based on a peaking factor of two the existing wastewater pretreatment system has the capacity to pretreat projected flows and loadings upstream of the new biological treatment components that will have to be installed to meet BOD and nitrogen treatment levels. As a means of providing system reliability and redundancy the biological system will include a mixed anoxic pretreatment lagoon to provide additional BOD removal prior to the oxic/anoxic biological treatment process (cyclic reactor) that will remove BOD and nitrogen to levels acceptable for disposal by subsurface disposal.

The existing system has the following limitations that must be addressed to handle the current and future processing plant wastewater flows:

- The physical/chemical pretreatment system is not capable of meeting the BOD and Nitrogen limits required by TDEC for management in a subsurface disposal system. A biological treatment system designed to nitrify and denitrify will be required to adequately treat processing plant wastewater upstream of subsurface disposal.

- The existing subsurface disposal system does not have the hydraulic capacity required to manage the projected processing plant treated wastewater flow. Hydraulic loading rates to the existing subsurface disposal areas (LPP and Chamber), if used, will have to be reduced to comply with nitrate nitrogen loading requirements.
- The existing subsurface disposal system has received extremely high hydraulic and organic loadings in the past and TDEC has expressed serious reservations regarding the acceptability of the existing subsurface areas to provide adequate treatment. Southeastern Provision intends to work with TDEC to assess the integrity of the existing subsurface areas with the hopes of possibly using the areas in the future to increase the overall hydraulic capacity of the entire system.

UPGRADED SYSTEM DESIGN BASIS

At peak production capacity the beef plant will process 400 head of cattle. Based on a reasonably liberal flow of 250 gallons per head per day the plant will generate approximately 100,000 gallons per day of wastewater to be handled.

Table No. 2 summarizes test data for typical samples taken from the discharge of the dissolved air flotation pretreatment system.

Table No. 2
Wastewater Characteristics (DAF Effluent)

Parameter	8/2/2018	8/15/2018
pH	7.4	5.5
Alkalinity, mg/l	550	151
COD, mg/l	782	
BOD5, mg/l	486	402
TSS, mg/l	75.8	18.1
TKN, mg/l	85	54.3
NH3N, mg/l	110	62.2
Total Phosphorus, mg/l	0.109	0.0928

In order to provide for a conservative design the following influent and effluent design parameters will be used for the design of the biological treatment system that will be installed upstream of the new subsurface disposal systems.

Parameter	Design Influent	Design Effluent
Flow, gpd	100,000	100,000
BOD, mg/l	1,000	<20
TSS, mg/l	200	<10
Total Nitrogen, mg/l	150	<20
Total Kjeldahl Nitrogen, mg/l	150	<10
Total Nitrate/Nitrite Nitrogen, mg/l	0	<10

DESCRIPTION OF PROPOSED SYSTEM

Figure No. 2 provides a flow schematic for the proposed upgraded wastewater treatment system and subsurface disposal system. Figure No. 3 provides a preliminary layout drawing for the lined earthen basin biological treatment system that is proposed.

The proposed upgrades will include:

- DAF effluent transfer pumps to pump from the existing DAF effluent holding basins to the new biological treatment system

- New Membrane Lined Earthen Basin Biological Treatment System consisting of:

  - Lined Mixed Anoxic Lagoon for flow equalization, BOD pretreatment, organic nitrogen conversion to ammonia nitrogen, and denitrification
  - Lined Mixed Oxic/Anoxic Lagoon for BOD/TSS removal and nitrification/denitrification; lagoon will operate as a continuously fed intermittently decanted reactor basin (Cyclic Reactor)
  - Oxic/Anoxic Lagoon Diffused Aeration System with:
    - Three Positive Displacement (PD) Blowers
    - Diffused Aeration System with floating laterals and retrievable fine bubble diffusers
  - Floating Decanters for Oxic/Anoxic Lagoon
  - Lined Effluent Storage Lagoon
  - Sludge Wasting and Recycle Pumps for Oxic/Anoxic Lagoon
  - Lined Aerobic Sludge Digestion/Storage Lagoon with Supernent Return Pumps

- New Subsurface Disposal System Dosing Pumps
- Pressure filters
- Enlarged SSDS consisting of drip dispersion. The existing LPP and chamber areas may be used in the future if work with TDEC indicates the integrity of the areas is acceptable.

Table No. 3 provides a design analysis for the biological treatment system. Table No. 4 summarizes the details for the upgraded treatment system.

SCOPE OF WASTEWATER UPGRADE PROJECT

1. New biological treatment system will be installed to reduce BOD, TSS, Oil and Grease, Total Nitrogen, Ammonia Nitrogen, and Nitrate/Nitrite Nitrogen in effluent to be managed with Subsurface Disposal System. Biological system will consist of Anoxic Lagoon, Oxic/Anoxic Lagoon, Effluent Storage Lagoon, and Aerobic Sludge Lagoon. System will be designed in accordance with TDEC design guidelines.

2. New Subsurface Disposal System will be added to handle the projected maximum flow of up to 100,000 gallons per day. System will be designed in accordance with TDEC design guidelines.

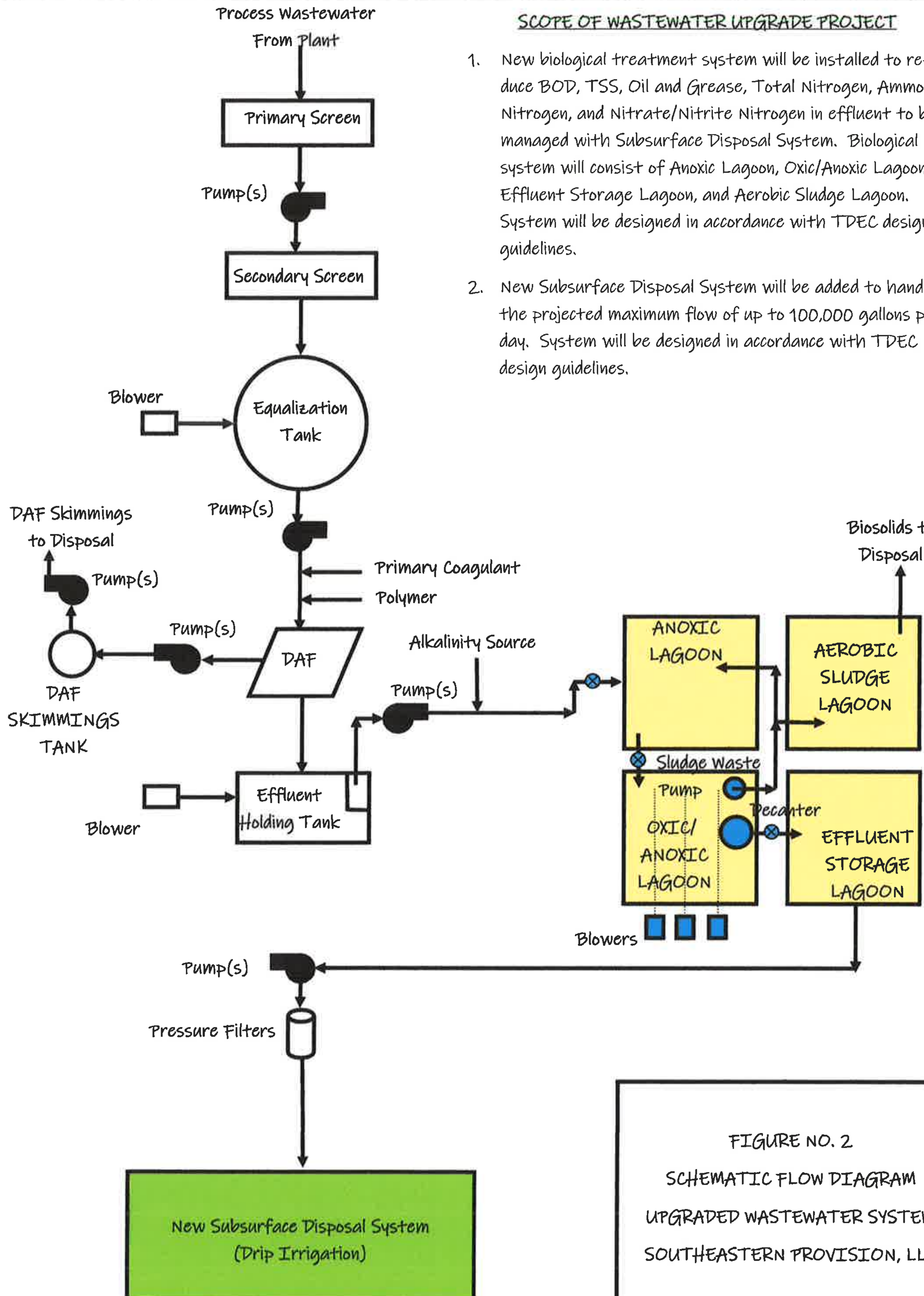


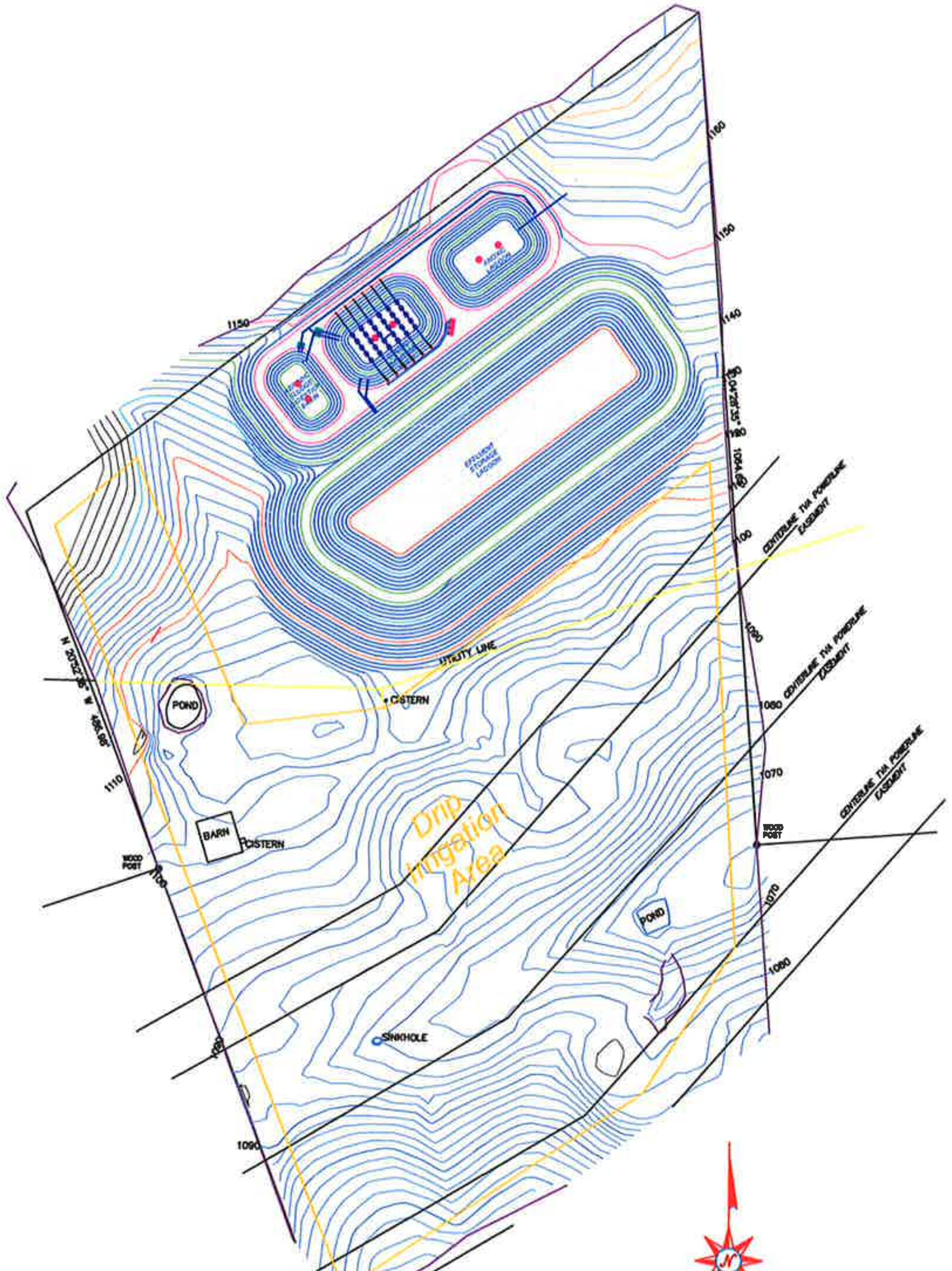
FIGURE NO. 2

SCHEMATIC FLOW DIAGRAM

UPGRADED WASTEWATER SYSTEM

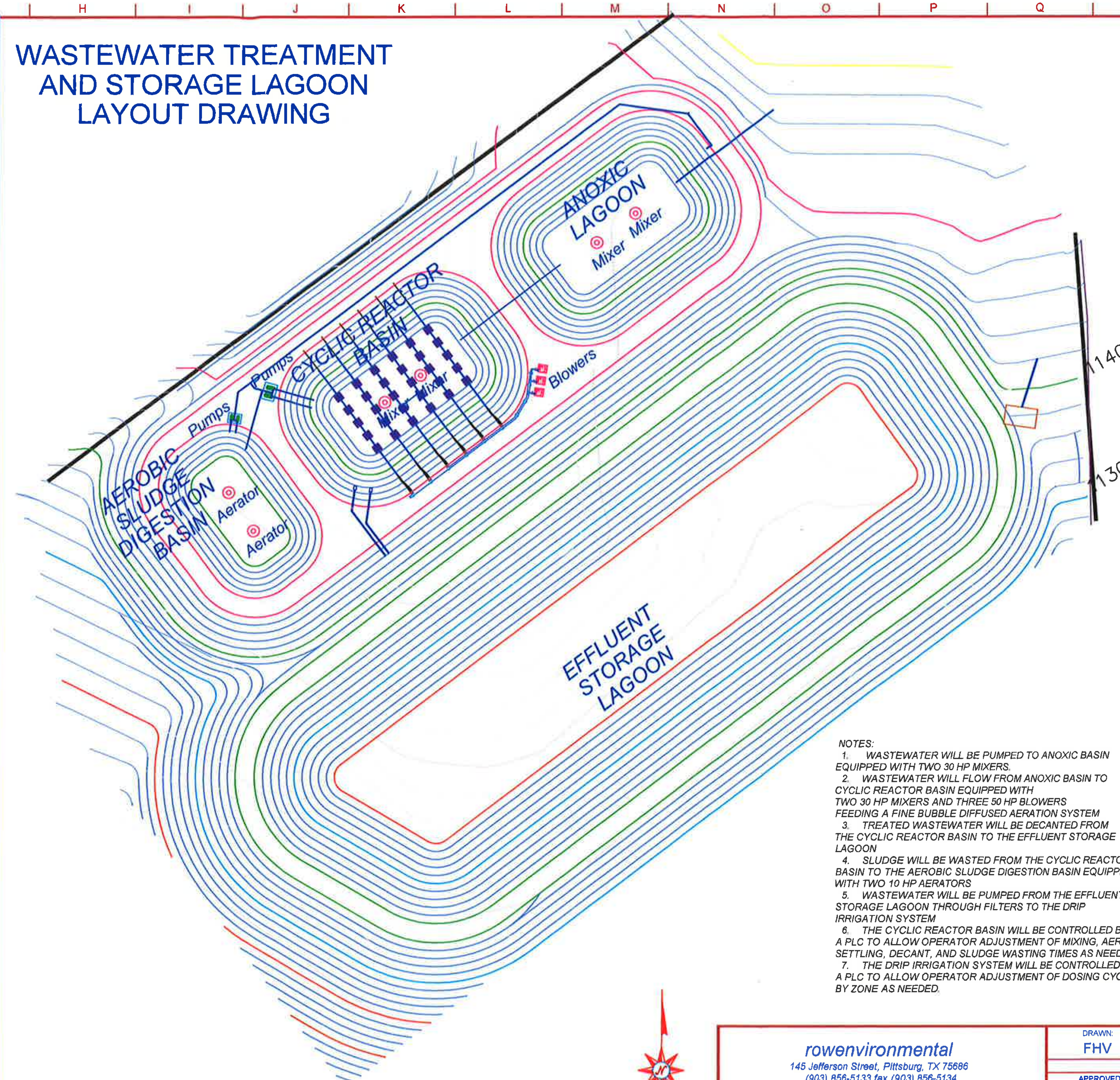
SOUTHEASTERN PROVISION, LLC

WASTEWATER TREATMENT AND DRIP IRRIGATION SITE PLAN AND TOPO MAP



NOTES:
1. THE DRIP IRRIGATION SYSTEM DETAILS WILL BE PROVIDED DURING THE DETAILED DESIGN PHASE OF THE PROJECT.
2. THE DRIP SYSTEM WILL BE DEVELOPED IN 3 PHASES WITH 125,000 FT OF DRIP LINE INSTALLED IN PHASE 1 AND 62,500 FT OF DRIP LINE INSTALLED IN PHASE 2 AND 3.

WASTEWATER TREATMENT AND STORAGE LAGOON LAYOUT DRAWING



NOTES:
1. WASTEWATER WILL BE PUMPED TO ANOXIC BASIN EQUIPPED WITH TWO 30 HP MIXERS.
2. WASTEWATER WILL FLOW FROM ANOXIC BASIN TO CYCLIC REACTOR BASIN EQUIPPED WITH TWO 30 HP MIXERS AND THREE 50 HP BLOWERS FEEDING A FINE BUBBLE DIFFUSED AERATION SYSTEM
3. TREATED WASTEWATER WILL BE DECANTED FROM THE CYCLIC REACTOR BASIN TO THE EFFLUENT STORAGE LAGOON
4. SLUDGE WILL BE WASTED FROM THE CYCLIC REACTOR BASIN TO THE AEROBIC SLUDGE DIGESTION BASIN EQUIPPED WITH TWO 10 HP AERATORS
5. WASTEWATER WILL BE PUMPED FROM THE EFFLUENT STORAGE LAGOON THROUGH FILTERS TO THE DRIP IRRIGATION SYSTEM
6. THE CYCLIC REACTOR BASIN WILL BE CONTROLLED BY A PLC TO ALLOW OPERATOR ADJUSTMENT OF MIXING, AERATION, SETTLING, DECANT, AND SLUDGE WASTING TIMES AS NEEDED.
7. THE DRIP IRRIGATION SYSTEM WILL BE CONTROLLED BY A PLC TO ALLOW OPERATOR ADJUSTMENT OF DOSING CYCLES BY ZONE AS NEEDED.

rowenvironmental
145 Jefferson Street, Pittsburg, TX 75686
(903) 856-5133 fax (903) 856-5134
email: rowenvironmental@hotmail.com

FIGURE NO. 3
NEW WASTEWATER TREATMENT SYSTEM LAYOUT DRAWING

SOUTHEASTERN PROVISION
BEAN STATION, TENNESSEE

DRAWN:	FHV
APPROVED	VDR
DATE:	7/28/2020
SCALE:	1"=100'
FILENAME:	SP-2020-S04
DRAWING NUMBER	SP-2020-S04

Table No. 3
Design Analysis
Cyclic Reactor Process - 0.1 mgd capacity
LINED Earthen Basin with Diffused Aeration
Project:
Southeastern Provision, Bean Station, TN

Project Assumptions:

1. Average wastewater characteristics to be below levels listed below.
2. Sufficient alkalinity exists in wastewater for nitrification. Supplemental alkalinity to be provided by Owner if needed.
3. No heavy metals or toxic organic compounds are present in the wastewater which will inhibit biological treatment.

Loadings/Effluent Requirements:

Loadings	DAF Effluent/ Anaerobic Lagoon Inf.	Anaerobic Lagoon Eff./ Oxic/Anoxic Inf.	Oxic/ Anoxic Effluent
Flow, mgd	0.1	0.1	0.1
BOD, mg/l	1,000	600	20
BOD, lbs/day	834	500	17
TSS, mg/l	200	100	10
TSS, lbs/day	167	83	8
TKN, mg/l	150	150	10
TKN, lbs/day	125	125	8
NH3N, mg/l	100	150	10
NH3N, lbs/day	83	125	8
NO3N + NO2N, mg/l	0	0	10
NO3N + NO2N, lbs/day	0	0	8
TN, mg/l	150	150	20
TN, lbs/day	125	125	17

Table No. 3 - Design Analysis (continued)
Cyclic Reactor Process - 0.1 mgd capacity
LINED Earthen Basin with Diffused Aeration
Project:

Southeastern Provision, Bean Station, TN

Design	Anaerobic	Comments
Loading, lbs/day	834	Loading, lbs/day = Flow, mgd x Influent BOD, mg/l x 8.34
Design Load, lbs BOD/day/1,000 cu ft	6.5	Normal value 5 to 20; use 6.5
Volume, gallons	960,383	Volume, gal = Volume, cu ft x 7.485
Detention Time, days	9.60	Detention Time, days = Volume, gal / Flow, gpd
Volume at High Level, cu ft	128,308	Volume = Loading x 1000 / Design Load
Average Surface Area, sq ft	9,165	Avg Surface Area = Volume, cu ft / Depth, ft
Width to Length Ratio	0.68	Design assumption
Side Slope	2.0	Design assumption
Depth at High Level, feet	14	Design assumption
Length at High Water Level, feet	147	(*) See equation below
Width at High Water Level, feet	100	Width = Length at High Water x Width to Length Ratio
Length at Bottom, feet	91	Length = Length at High Water - (Depth at High Level x Side Slope x 2)
Width at Bottom, feet	44	Width = Width at High Water Level - (Side Slope x Depth at High Level x 2)
Freeboard, feet	2	Design assumption
Total Depth, feet	16	Total Depth = Depth at High Level + Freeboard
Length at Inside Bank, feet	155	Length = Length at High Water + (Freeboard x Side Slope x 2)
Width at Inside Bank, feet	108	Width = Width at High Water Level + (Freeboard x Side Slope x 2)

(*) Length = ((((4 x W:L x Avg Area)-(6 x W:L x (Slope x HWL)^2)+(2 x (Slope x LWL)^2))^0.5)+((Slope x HWL)*(1+W:L)))/(2*W:L)

Table No. 3 - Design Analysis (continued)
Cyclic Reactor Process - 0.1 mgd capacity
LINED Earthen Basin with Diffused Aeration
Project:
Southeastern Provision, Bean Station, TN

Design	Cyclic Reactor	Comments
Detention Time at Low Level, days	9.35	Detention Time = Low Volume / Flow
Detention Time at High Level, days	9.60	Detention Time = High Volume / Flow
BOD Loading, lbs/day	500	BOD Loading, lbs/day = Flow, mgd x BOD, mg/l x 8.34
Food to Microorganism Ratio	0.029	Normal 0.01 to 0.1; use 0.22
MLVSS in System, lbs	17,553	MLVSS, lbs/day = BOD Loading / F:M Ratio
Volatile Solids, percent	75.00	Design assumption
MLSS in System, lbs	23,403	MLSS, lbs/day = MLVSS / (65% Volatile Solids/100)
MLSS at Low Level, mg/l	3,000	Design assumption
Volume at Low Level, gallons	935,390	Volume, gal = MLSS, lbs / (MLSS, mg/l x 8.34)
Cycles per day	4	Design assumption
Volume Decanted each Cycle, gallons	25,000	Cycles = Flow / Cycles per day
Excess Decant Volume Capacity, percent	0	Design assumption
Volume at High Level, gallons	960,390	High Volume = Low Vol + Decant Vol + Excess Decant Vol
Volume at High Level, cu ft	128,309	Volume, cu ft = Volume, gal / 7.485
Average Surface Area, sq ft	9,165	Avg Surface Area = Volume, cu ft / Depth, ft
Width to Length Ratio	0.68	Design assumption
Side Slope	2.0	Design assumption
Depth at High Level, feet	14	Design assumption
Length at High Water Level, feet	147	(*) See equation below
Width at High Water Level, feet	100	Width = Length at High Water x Width to Length Ratio
Length at Bottom, feet	91	Length = Length at High Water - (Depth at High Level x Side Slope x 2)
Width at Bottom, feet	44	Width = Width at High Water Level - (Side Slope x Depth at High Level x 2)
Freeboard, feet	2	Design assumption
Total Depth, feet	16	Total Depth = Depth at High Level + Freeboard
Length at Inside Bank, feet	155	Length = Length at High Water + (Freeboard x Side Slope x 2)
Width at Inside Bank, feet	108	Width = Width at High Water Level + (Freeboard x Side Slope x 2)

(*) Length = ((((4 x W:L x Avg Area)-(6 x W:L x (Slope x HWL)^2)+(2 x (Slope x LWL)^2))^0.5)+((Slope x HWL)*(1+W:L)))/(2*W:L)

Table No. 3 - Design Analysis (continued)
Cyclic Reactor Process - 0.1 mgd capacity
LINED Earthen Basin with Diffused Aeration
Project:

Southeastern Provision, Bean Station, TN

Design	Cyclic Reactor	Comments
Depth at Low Level, feet	11.75	
BOD Removal Efficiency, %	96.67%	BOD Rem Eff = 100 x (Inf BOD - Eff BOD) / Inf BOD
BOD Removed, lbs/day	484	BOD Removed = BOD Applied x BOD Rem Eff
TKN Removal Efficiency, %	93.33%	TKN Rem Eff = 100 x (Inf TKN - Eff TKN) / Inf TKN
TKN Removed, lbs/day	117	TKN Removed = TKN Applied x TKN Rem Eff
Oxygen Requirement, lbs/lb BOD Rem	1.5	Normal Range = 1 to 1.5; use 1.5 for cyclic process
Oxygen Requirement, lbs/lb NH3N Rem	4.6	Normal Requirement = 4.6
BOD AOR, lbs/day	726	BOD AOR = BOD Removed x BOD Oxygen Reqd
TKN AOR, lbs/day	537	TKN AOR = TKN Removed x TKN Oxygen Reqd
Denitrification Credit	40.00%	Normal Value = 50 %; use 40 %
Total AOR, lbs/day	1,048	Total AOR = BOD AOR + TKN AOR - Denitrification Credit
Temperature, deg C	28	Design assumption
Elevation, feet	1150	Given
Average Water Depth in Reactor, ft	12.9	Design assumption
Alpha	0.7	Normal Range = 0.7 to 0.85; use 0.7
Beta	0.8	Normal Range = 0.8 to 1.0; use 0.8
Theta	1.024	Constant
Operating DO, mg/l	2	Design assumption
C-SC, mg/l (constant)	9.09	Saturation DO at standard conditions
C-DC, mg/l (saturation at site conditions)	7.81	Saturation DO at site conditions
Oxygen Transfer Adjustment Factor	0.40	Factor = (((C-DC x Beta)-Op DO) x (Theta^(Temp -20)) x Alpha)/C-SC
SOR, lbs/day	2,650	SOR = AOR / Oxygen Transfer Adjustment Factor
SOR, lbs/hr	110	SOR, lbs/hr = SOR, lbs/day / 24
Time of Aeration during each Cycle, hours	3.00	Design assumption

Table No. 3 - Design Analysis (continued)
Cyclic Reactor Process - 0.1 mgd capacity
LINED Earthen Basin with Diffused Aeration
Project:
Southeastern Provision, Bean Station, TN

Design	Cyclic Reactor	Basis
Total Aeration, hours per day	12.0	Total Aeration, hrs = Cycles per day x Time of Aeration During Each Cycle
SOR During Aeration, lbs/hr	221	SOR During Aeration, lbs/hr = SOR, lbs/hr x (24 / Total Aeration, hours/day)
Aeration Type	Diffused Aeration	Design selection
Oxygen Transfer, lbs SOR/hp-hr (clean water)	4	From equipment supplier
Theoretical Brake Horsepower for Aeration, hp	55.2	BHP = SOR During Aeration / Oxygen Transfer
Installed Aeration Brake Horsepower, hp	150	Use 3 @ 50

Design	Storage Basin	Basis
Decant Basin Volume, gallons	7,700,000	Volume = Design Flow, gpd
Decant Basin Volume, cu ft	1,028,724	Volume, cu ft = Volume, gal / 7.485
Average Surface Area, sq ft	57,151	Avg Surface Area = Volume, cu ft / Depth, ft
Width to Length Ratio	0.34	Design assumption
Side Slope	2.5	Design assumption
Depth at High Level, feet	18	Design assumption
Length at High Water Level, feet	498	(*) See equation below
Width at High Water Level, feet	169	Width = Length at High Water x Width to Length Ratio
Length at Bottom, feet	408	Length = Length at High Water - (Depth at High Level x Side Slope x 2)
Width at Bottom, feet	79	Width = Width at High Water Level - (Side Slope x Depth at High Level x 2)
Freeboard, feet	2	Design assumption
Total Depth, feet	20	Total Depth = Depth at High Level + Freeboard
Length at Inside Bank, feet	508	Length = Length at High Water + (Freeboard x Side Slope x 2)
Width at Inside Bank, feet	179	Width = Width at High Water Level + (Freeboard x Side Slope x 2)

(*) Length = ((((4 x W:L x Avg Area)-(6 x W:L x (Slope x HWL)^2)+(2 x (Slope x LWL)^2))^0.5)+((Slope x HWL)*(1+W:L)))/(2*W:L)

Table No. 3 - Design Analysis (continued)
Cyclic Reactor Process - 0.1 mgd capacity
LINED Earthen Basin with Diffused Aeration
Project:
Southeastern Provision, Bean Station, TN

Sludge Analysis	Sludge Basin	Comments
Sludge Production, lbs/lb BOD Rem	0.50	Normal Range = 0.3 to 1.0; use 0.50
Sludge Production, lbs/lb TKN Rem	0.15	Normal Range = 0.1 to 0.2; use 0.15
Total Sludge Production, lbs/day	346	Total Sludge Production = (BOD Removed x 0.5 + TKN Removed x 0.15) / % Volatile Solids
Sludge Age, days	67.7	Sludge Age, days = Total Sludge in System, lbs / Total Sludge Production, lbs/day
Sludge Solids Content, %	1	Design assumption
Sludge Volume, gallons/day	4,147	Sludge Volume, gpd = (Sludge Production, lbs/day / (Sludge Solids, % / 100)) x 8.34
Sludge Wasting Each Cycle, minutes	30	Design assumption
Sludge Wasted Each Cycle, gallons	1,037	Sludge, gal/cycle = Sludge, gal/day / Cycles per day
Sludge Pump Flow Rate, gpm	35	Pump Rate = Gal per cycle / Wasting time per cycle, min; use 2 @ 50 gpm
Sludge Basin Detention Time, days	65.0	Design assumption
Sludge Basin Volume, cubic feet	36,010	Volume, cu ft = Volume, gal / 7.485
Sludge Basin Volume, gallons	269,533	Volume, gal = Detention Time, days x Sludge volume, gal/day
Average Surface Area, sq ft	4,501	Avg Surface Area = Volume, cu ft / Depth, ft
Width to Length Ratio	0.65	Design assumption
Side Slope	2.0	Design assumption
Depth at High Level, feet	8	Design assumption
Length at High Water Level, feet	102	(*) See equation below
Width at High Water Level, feet	66	Width = Length at High Water x Width to Length Ratio
Length at Bottom, feet	70	Length = Length at High Water - (Depth at High Level x Side Slope x 2)
Width at Bottom, feet	34	Width = Width at High Water Level - (Side Slope x Depth at High Level x 2)
Freeboard, feet	2	Design assumption
Total Depth, feet	10	Total Depth = Depth at High Level + Freeboard
Length at Inside Bank, feet	110	Length = Length at High Water + (Freeboard x Side Slope x 2)
Width at Inside Bank, feet	74	Width = Width at High Water Level + (Freeboard x Side Slope x 2)

(*) Length = ((((4 x W:L x Avg Area)-(6 x W:L x (Slope x HWL)^2)+(2 x (Slope x LWL)^2))^0.5)+((Slope x HWL)*(1+W:L)))/(2*W:L)

Table No. 3 - Design Analysis (continued)
Cyclic Reactor Process - 0.1 mgd capacity
LINED Earthen Basin with Diffused Aeration
Project:

Southeastern Provision, Bean Station, TN

Sludge Analysis	Sludge Basin	Comments
Total Sludge Production, lbs/day	346	Total Sludge Production = (BOD Removed x 0.4 + TKN Removed x 0.15) / % Volatile Solids
Biomass in Sludge, lbs/day	259	Biomass = Total Sludge Production x % Volatile Solids
Biomass Reduced in Digester, %	50	Design Assumption
Biomass Reduced, lbs/day	130	Biomass Reduced = Biomass in Sludge, lbs/day x Biomass Reduced, %
Oxygen Requirements, lb/lb Solids	2.3	Design assumption
Oxygen Requirements, lbs/day (standard conditions)	298	Oxygen Reg'd = Biomass Reduced, lbs/day x O2 Reg'd, lbs/lb solids
Oxygen Requirements, lbs/day (site conditions)	597	Air, site conditions = Air, standard conditions/Oxygen Transfer Adj. Fact.
Oxygen Transfer Rate, lbs/ hp hr	3	Design assumption
Theoretical Aerator HP	8	Aerator HP = Oxygen Reqd, lbs/day/24/Oxygen Transfer Rate
Installed Aerator HP	20	(USE 2 @ 10 HP)

Table No. 4
Component Details
Upgraded Wastewater Management System

Component	Description
Pretreated Wastewater Transfer Pumps	Two self priming centrifugal pumps with VFD's; 250 gpm
Lined Anoxic Lagoon	960,383 gallons; 108 ft wide by 155 ft long by 16 ft deep; lined with 80 mil HDPE liner; two 30 hp floating mixers
Lined Oxic/Anoxic Lagoon	960,383 gallons; 108 ft wide by 155 ft long by 16 ft deep; lined with 80 mil HDPE liner; two 30 hp floating mixers; three 50 hp blowers with diffused aeration; two floating decanters
Lined Effluent Storage Lagoon	7,700,000 gallons; 179 ft wide by 508 ft long by 20 ft deep; lined with 80 mil HDPE liner
Lined Aerobic Sludge Lagoon	269,533 gallons; 74 ft wide by 110 ft long by 10 ft deep; lined with 80 mil HDPE liner; two 10 hp floating aerators
Oxic/Anoxic Lagoon Aeration System	Three 50 hp positive displacement blowers with VFD's; floating diffuser laterals with retrievable fine bubble diffusers
Oxic/Anoxic Lagoon Decant System	Two 600 gpm floating decanters
Sludge Wasting and Recycle Pumps	Two self priming centrifugal pumps with VFD's; 100 gpm
New Subsurface Disposal System Dosing Pumps	Two new centrifugal pumps will be provided for the new drip dispersal areas; new pumps will be 250 gpm with VFD's
Pressure Filters	New pressure multimedia filtration system will be installed upstream of drip system; new filters will have capacity of 250 gpm
Subsurface Disposal System	The drip dispersal system will be required to handle up to 100,000 gallons per day at peak flow if the existing subsurface disposal areas can not be used in the future. A total of up to 500,000 sf of drip area will be required. This will require up to 250,000 feet of drip tubing. See Table No. 5. The drip system will be constructed in phases with 250,000 sf installed initially followed by up to 125,000 sf in each of two more phases.

Southeastern Provision has adequate land to handle the projected peak design flow of 100,000 gallons per day plus a 100 percent reserve area. The facility is currently generating approximately 40,000 gallons per day of wastewater. The peak flow of 100,000 gallons per day will not be reached for many years depending upon market conditions. The construction of the wastewater treatment and subsurface disposal upgrades will be staged as follows within the allowable special conditions of the permit:

- Phase 1 - The biological wastewater treatment and storage system will be constructed in conjunction with the addition of 250,000 sf of drip area. The wastewater system will be constructed initially to handle the peak flow of 100,000 gallons per day. This will allow for a very conservative design during startup and allow the facility to demonstrate design performance.
- Phase 2 – Addition of 125,000 sf of drip area
- Phase 3 – Addition of 125,000 sf of drip area

Table No. 4
Hydraulic and Nutrient Loading Calculations
Subsurface Disposal System
Southeastern Provision, Bean Station, TN

Lwn =		Calculated Allowable Nitrate Loading Rate	Subsurface Disposal Systems will be designed based on hydraulic loading of 0.2 gpd/sf. The loading is below the allowable nitrogen based loading rate.
Pr =		5-yr return monthly precipitation (in/month)	
PET =		Potential evapotransporation (in/month)	
N =	Uptake	Monthly nitrogen uptake rate by vegetation (lbs/acre/month)	
F =		Applied nitrogen fraction removed by denitrification/volatization (%(	
Cp =	10	Maximum nitrate concentration in leachate (mg/l)	Depth to water table in the SSDS areas is greater than 200 cm.
Cn =	20	Nitrogen concentration in applied wastewater (mg/l)	
	4.413	Conversion factor	
U =	100	Annual nitrogen uptake rate for crop, variable (lbs/acre/year)	Depth to most restrictive zone in the SSDS areas is greater than 200 cm.
Ksat =	9.17	Saturated hydraulic conductivity (micrometers/sec) (NRCS)	
Ksat =	31.19	Saturated hydraulic conductivity (inches/day) (NRCS)	
Lwh (max) =	5.00	Applied effluent max loading rate (gpd/sf) (10% NRCS Ksat)	
Lwh (max) =	0.25	Applied effluent max loading rate (gpd/sf) (TDEC max)	

MONTH	Pr, in/month	PET, in/month	N Uptake, %/month	N Uptake, lb/ac/ month	F (Denitrification), %/month	Lwn, in/month	Lwn, in/week	Lwn, in/day	Lwn, gpd/sf	Lwh, gpd/sf (based on Loam soil)
Jan	7.62	0.1	1%	1	25%	15.92	3.60	0.51	0.320	0.20
Feb	6.72	0.27	2%	2	25%	14.67	3.67	0.52	0.327	0.20
Mar	8.85	0.97	4%	4	27%	20.97	4.73	0.68	0.422	0.20
Apr	6.59	2.3	8%	8	29%	18.62	4.34	0.62	0.387	0.20
May	6.13	3.59	12%	12	31%	20.62	4.66	0.67	0.415	0.20
Jun	5.52	4.9	15%	15	33%	21.29	4.97	0.71	0.443	0.20
Jul	6.85	5.44	17%	17	35%	29.71	6.71	0.96	0.598	0.20
Aug	4.73	5	15%	15	35%	21.17	4.78	0.68	0.426	0.20
Sep	5.54	3.79	12%	12	34%	22.02	5.14	0.73	0.458	0.20
Oct	4.47	1.98	8%	8	32%	16.72	3.78	0.54	0.336	0.20
Nov	6.11	0.82	4%	4	29%	16.80	3.92	0.56	0.349	0.20
Dec	7.55	0.27	2%	2	26%	17.01	3.84	0.55	0.342	0.20
Total	76.68	29.43	100%	100		235.50462				

As has been noted, the facility currently has 15,000 ft of existing subsurface disposal area that is being restricted from use by TDEC due to potentially excessive hydraulic and organic loading in the past. Southeaster Provision intends to work with TDEC to determine if any or all of the existing fields can be brought back on line a some point in the future. It the existing subsurface systems can be utilized the drip areas installed in Phase 2 and Phase 3 may vary.

SOLIDS HANDLING AND DISPOSAL

The facility generates or will generate the following residual solids that require handling and disposal:

- Manure
- DAF Skimmings
- Biosolids

An application for a permit by rule to allow the land application of these materials has been submitted to TDEC under separate cover.

DOMESTIC POTABLE WELLS WITHIN 1000 FEET OF FACILITY

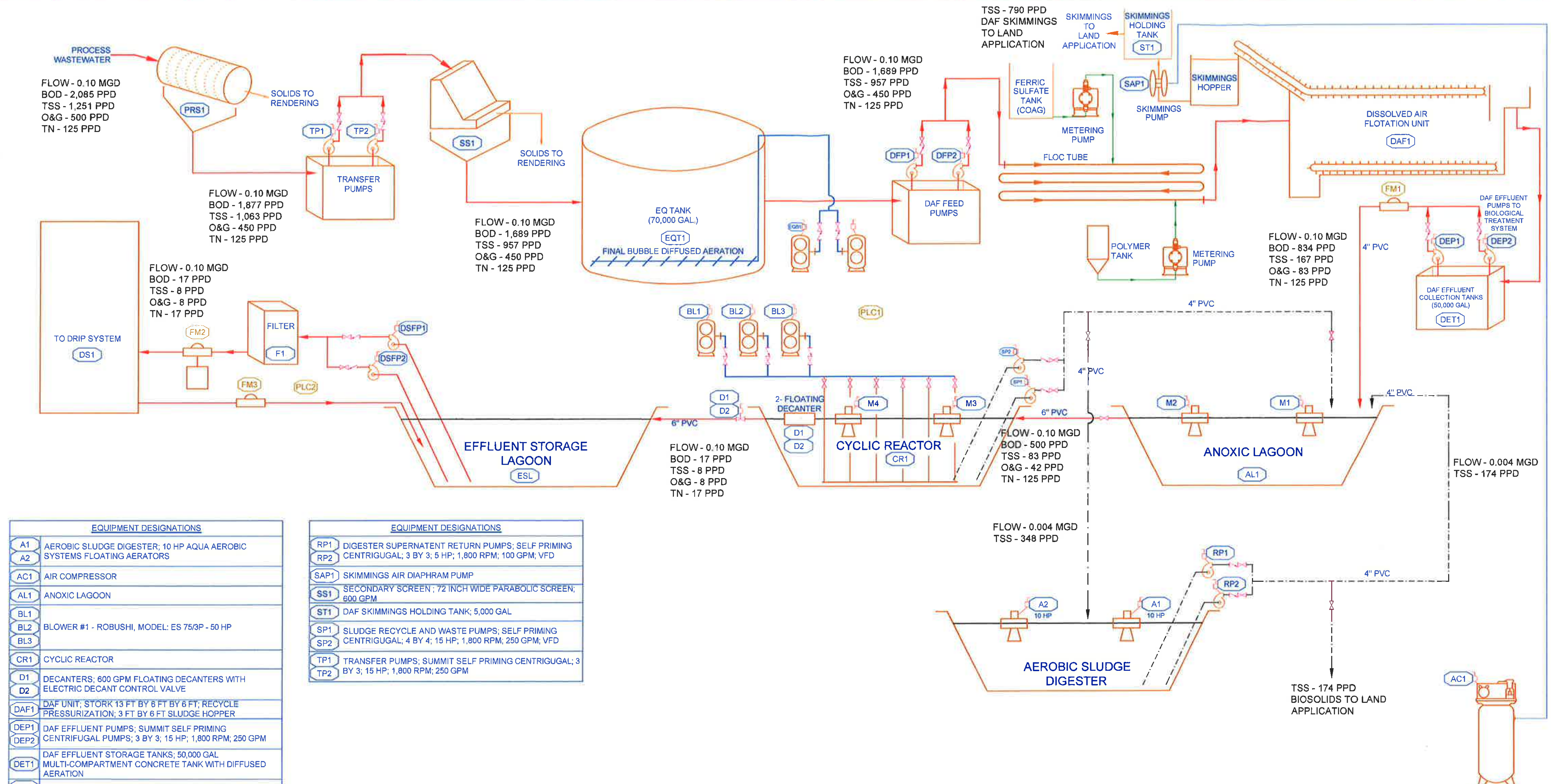
The attached topographic map shows known potable wells within 1000 feet of the plant.

MASS BALANCE

Figure No. 4 provides a process flow diagram with mass balance data for key parameters noted.

HYDRAULIC PROFILE

Figure No. 5 provides a hydraulic profile for the total system from the existing DAF pretreatment area to the new biological treatment system and drip subsurface dispersal system.



EQUIPMENT DESIGNATIONS	
A1, A2	AEROBIC SLUDGE DIGESTER; 10 HP AQUA AEROBIC SYSTEMS FLOATING AERATORS
AC1	AIR COMPRESSOR
AL1	ANOXIC LAGOON
BL1, BL2, BL3	BLOWER #1 - ROBUSHI, MODEL: ES 75/3P - 50 HP
CR1	CYCLIC REACTOR
D1, D2	DECANTERS; 600 GPM FLOATING DECANTERS WITH ELECTRIC DECANT CONTROL VALVE
DAF1	DAF UNIT; STORK 13 FT BY 6 FT BY 6 FT; RECYCLE PRESSURIZATION; 3 FT BY 6 FT SLUDGE HOPPER
DEP1, DEP2	DAF EFFLUENT PUMPS; SUMMIT SELF PRIMING CENTRIFUGAL PUMPS; 3 BY 3; 15 HP; 1,800 RPM; 250 GPM
DET1	DAF EFFLUENT STORAGE TANKS; 50,000 GAL MULTI-COMPARTMENT CONCRETE TANK WITH DIFFUSED AERATION
DFP1, DFP2	DAF FEEDS PUMPS; DURCO CENTRIFUGAL PUMPS; 3 BY 2; 15 HP; 3600 RPM; VFD'S; 250 GPM
DSFP1, DSFP2	DRIP SYSTEM FEED PUMPS; DURCO CENTRIFUGAL PUMPS; 3 BY 3; 15 HP; 3600 RPM; 250 GPM
DS1	DRIP SYSTEM
EQT1	EQUALIZATION TANK; 70,000 GALLON CIRCULAR CONCRETE BASIN WITH DIFFUSED AERATION; DUAL 5 HP PD BLOWERS (EQB1/EQB2)
ESL	EFFLUENT STORAGE LAGOON
F1	DRIP SYSTEM FILTER
M1, M2	ANOXIC LAGOON MIXERS; 30 HP AQUA AEROBIC SYSTEMS DDM FLOATING MIXERS
M3, M4	CYCLIC REACTOR MIXERS; 30 HP AQUA AEROBIC SYSTEMS DDM FLOATING MIXERS
PRS1	PRIMARY SCREEN ; 24" BY 72" HYCOR ROTARY DRUM SCREEN; 400 GPM

EQUIPMENT DESIGNATIONS	
RP1, RP2	DIGESTER SUPERNATENT RETURN PUMPS; SELF PRIMING CENTRIGUGAL; 3 BY 3; 5 HP; 1,800 RPM; 100 GPM; VFD
SAP1	SKIMMINGS AIR DIAPHRAM PUMP
SS1	SECONDARY SCREEN ; 72 INCH WIDE PARABOLIC SCREEN; 600 GPM
ST1	DAF SKIMMINGS HOLDING TANK; 5,000 GAL
SP1, SP2	SLUDGE RECYCLE AND WASTE PUMPS; SELF PRIMING CENTRIGUGAL; 4 BY 4; 15 HP; 1,800 RPM; 250 GPM; VFD
TP1, TP2	TRANSFER PUMPS; SUMMIT SELF PRIMING CENTRIGUGAL; 3 BY 3; 15 HP; 1,800 RPM; 250 GPM

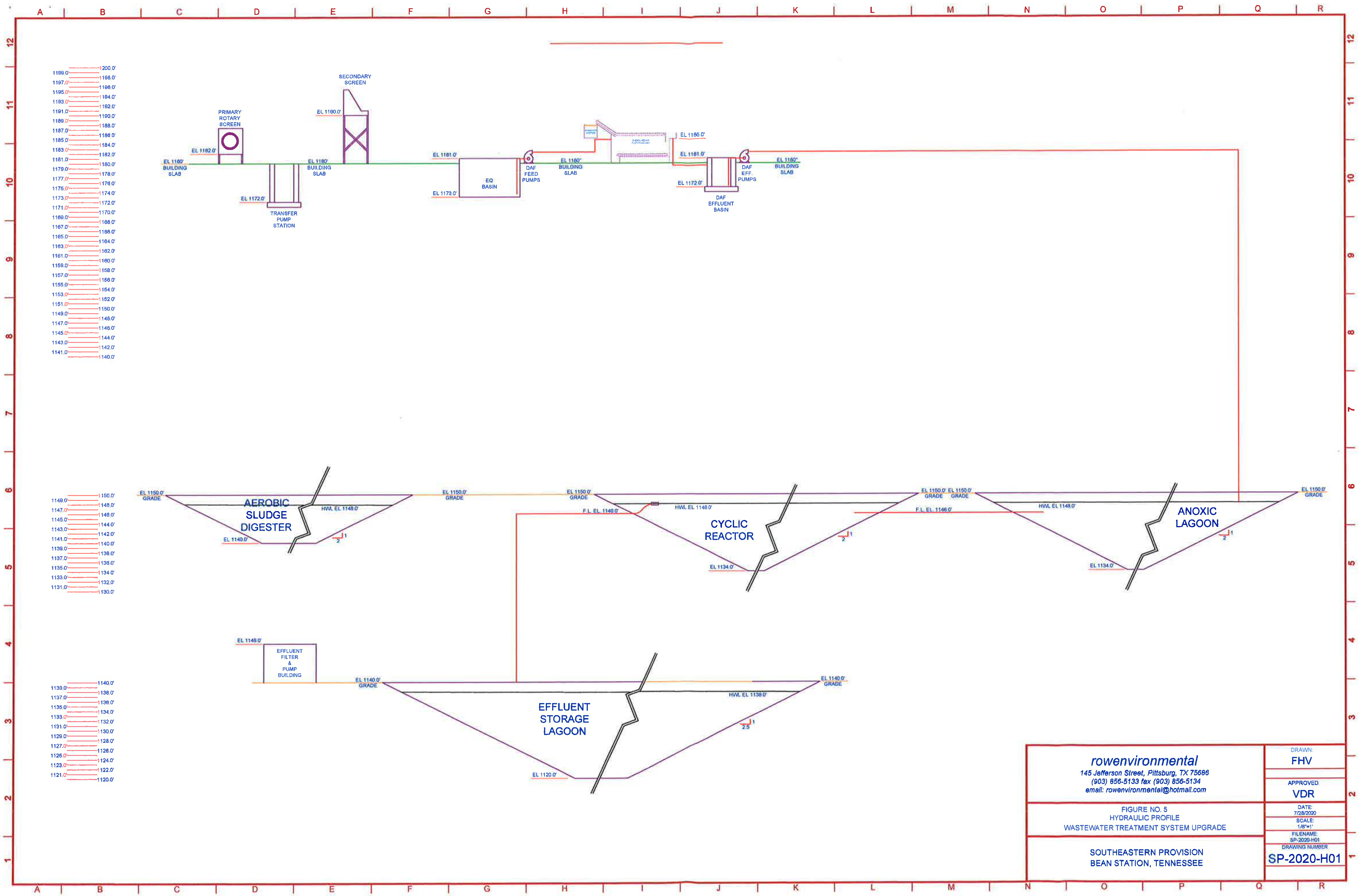
CONTROL AND MONITORING COMPONENTS	
FM1	DAF EFFLUENT FLOW METER; ENDRESS+HEUSER MAG METER WITH COMPOSITE SAMPLER CONTROL CAPABILITIES
FM2	DRIP SYSTEM INFLUENT FLOW METER; ENDRESS+HEUSER MAG METER WITH COMPOSITE SAMPLER CONTROL CAPABILITIES
FM3	DRIP SYSTEM DRIP LINE FLUSH WATER FLOW METER; ENDRESS+HEUSER MAG METER WITH COMPOSITE SAMPLER CONTROL CAPABILITIES
PLC1	PLC TO CONTROL BIOLOGICAL TREATMENT PROCESS PUMPS, BLOWERS, SENSORS, AND AUTOMATIC VALVES
PLC2	PLC TO CONTROL DRIP SYSTEM FILTER, PUMPS, AND VALVES

rowenvironmental
145 Jefferson Street, Pittsburg, TX 75686
(903) 856-5133 fax (903) 856-5134
email: rowenvironmental@hotmail.com

FIGURE NO. 4
PROCESS & INSTRUMENTATION DIAGRAM & MASS BALANCE
WASTEWATER TREATMENT SYSTEM UPGRADE

SOUTHEASTERN PROVISION
BEAN STATION, TENNESSEE

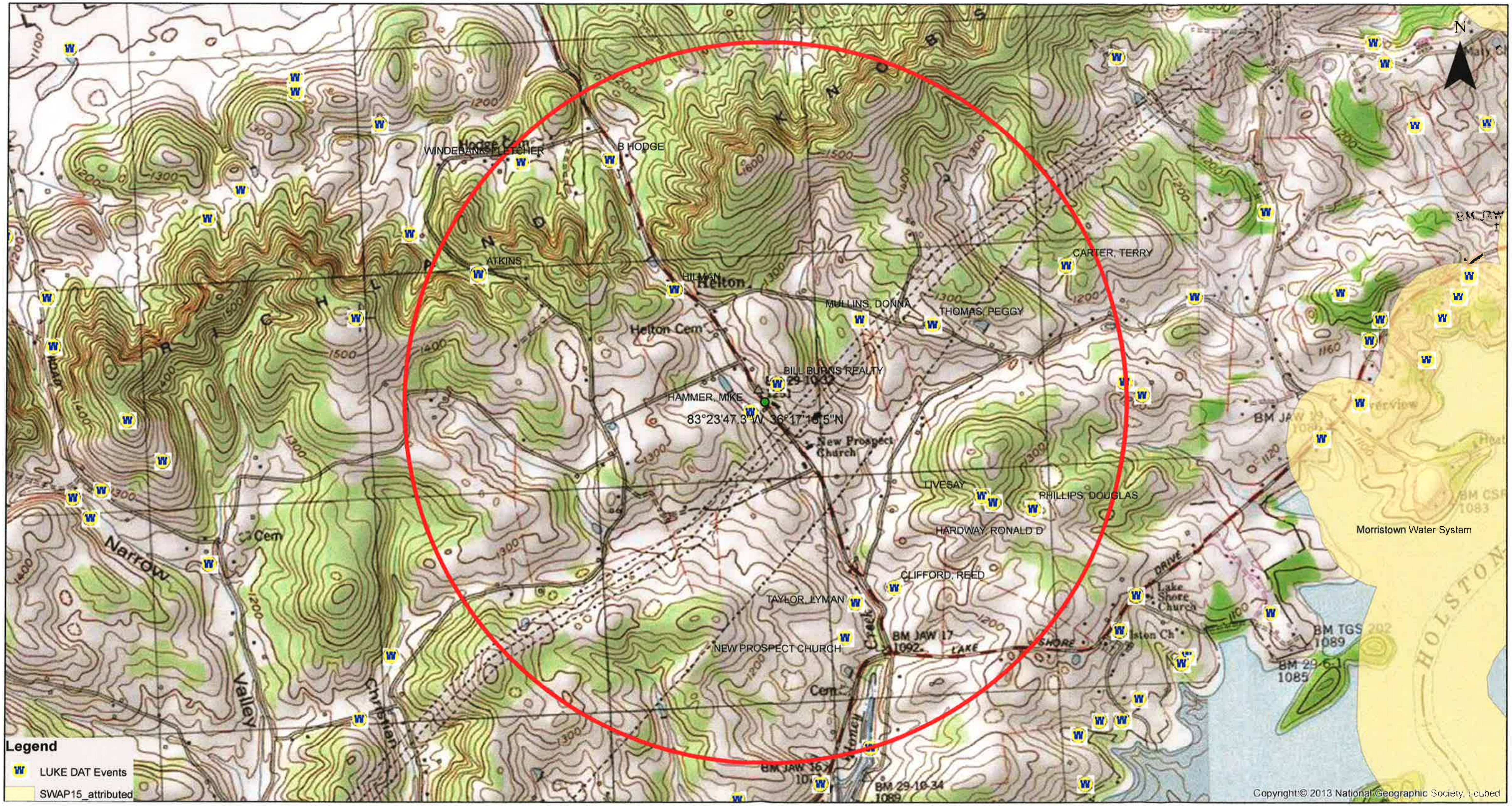
DRAWN: FHV
APPROVED: VDR
DATE: 7/28/2020
SCALE: N.T.S.
FILENAME: SP-2020-P01
DRAWING NUMBER: SP-2020-P01



PRIMARY ROTARY SCREEN
SECONDARY SCREEN
EL 1190.0'
EL 1182.0'
EL 1180' BUILDING SLAB
EL 1172.0'
TRANSFER PUMP STATION
EL 1181.0'
EQ BASIN
EL 1173.0'
DAF FEED PUMPS
EL 1186.0'
EL 1172.0'
DAF EFFLUENT BASIN
DAF EFF. PUMPS
EL 1150.0' GRADE
AEROBIC SLUDGE DIGESTER
HWL EL 1148.0'
EL 1140.0'
CYCLIC REACTOR
F.L. EL 1146.0'
HWL EL 1148.0'
EL 1134.0'
ANOXIC LAGOON
EL 1145.0'
EFFLUENT FILTER & PUMP BUILDING
EL 1140.0' GRADE
EFFLUENT STORAGE LAGOON
HWL EL 1138.0'
EL 1120.0'
rowenvironmental
145 Jefferson Street, Pittsburg, TX 75686
(903) 856-5133 fax (903) 856-5134
email: rowenvironmental@hotmail.com
FIGURE NO. 5
HYDRAULIC PROFILE
WASTEWATER TREATMENT SYSTEM UPGRADE
SOUTHEASTERN PROVISION
BEAN STATION, TENNESSEE
DRAWN: FHV
APPROVED: VDR
DATE: 7/28/2020
SCALE: 1/8"=1'
FILENAME: SP-2020-H01
DRAWING NUMBER: SP-2020-H01

TOPOGRAPHIC MAP

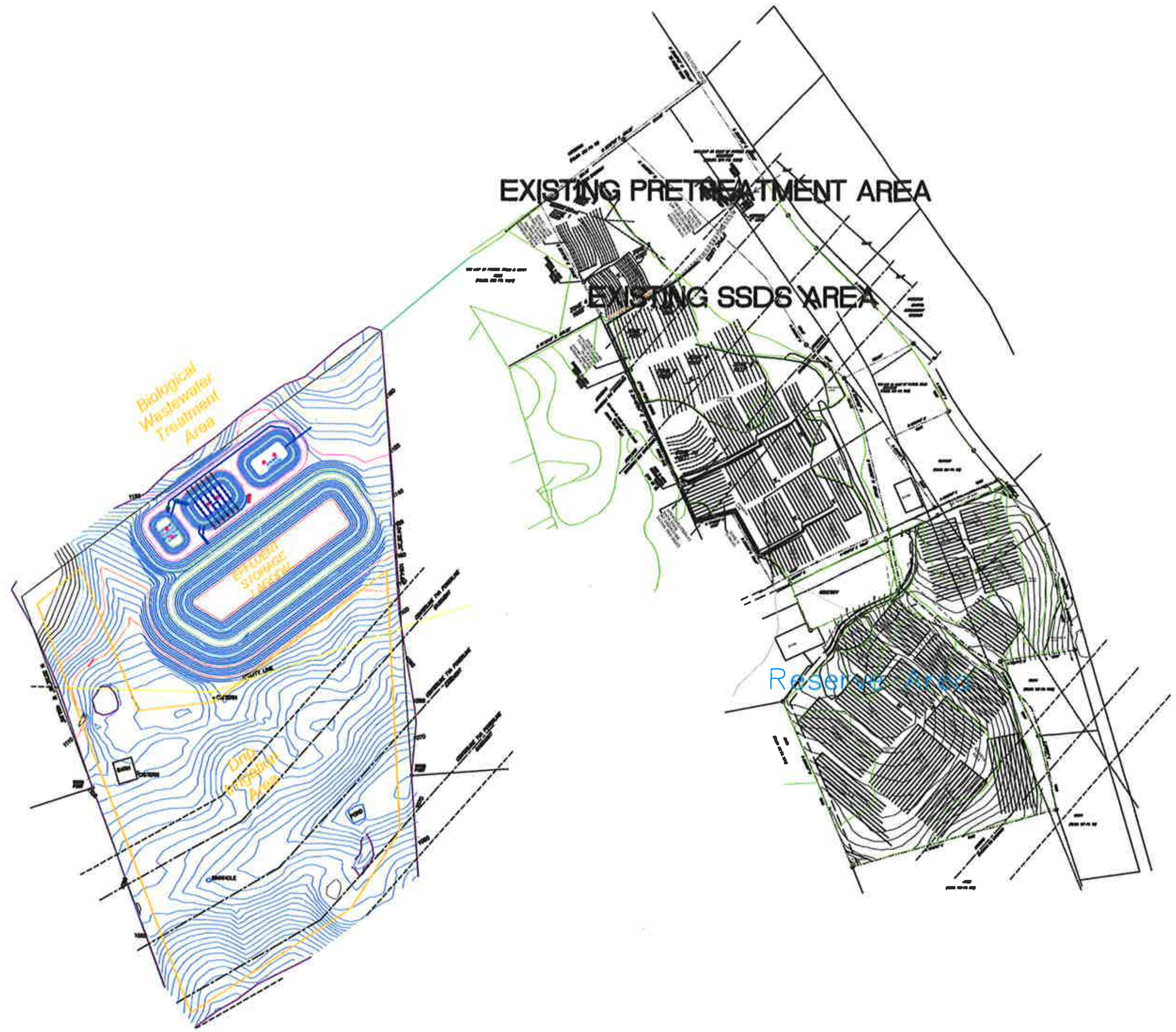
Southeastern Provision



0 950 1,900 3,800 5,700 7,600 Feet

SCALED LAYOUT OF FACILITY

The attached layout drawing is a compilation of the site plan for the existing system superimposed onto an aerial that shows the proposed wastewater treatment area and proposed drip dispersal system area.



SCOPE OF PROJECT:

PHASE 1 - Construct new 0.10 mgd biological wastewater treatment system and effluent storage pond; construct 125,000 ft of drip irrigation to handle 0.05 mgd.

PHASE 1A - Perform TDEC approved evaluation of existing subsurface disposal areas to determine if areas can be used as a part of overall wastewater management system. If existing subsurface disposal areas are deemed usable begin use in conjunction with drip irrigation when wastewater system is completed and demonstrated compliance with required treatment levels.

PHASE 2 - Construct 62,500 ft of drip irrigation to increase capacity to 0.075 mgd..

PHASE 3 - Construct 62,500 ft of drip irrigation to increase capacity to 0.1 mgd..

Note: Wastewater is currently being pumped and hauled offsite under TDEC issued SOP 18010. Southeastern Provision desires to stop incurring this operating expence as soon as practical. The construction of the wastewater treatment system, storage lagoon, and initial phase of drip irrigation will be initiated at the same time. It is possible the treatment system and a portion of the drip irrigation system may be completed before the storage lagoon is completed. It is also possible the existing subsurface disposal areas may be deemed usable during the time the wastewater system is being constructed. Southeastern Provision intends to work with TDEC within the bounds of the new SOP that is issued to start treating wastewater and dispersing it onsite at the earliest practical date and continue to proceed with the construction of Phase 1 components as the overall construction progress dictates.

150 0 75 150 300
INCHES

rowenvironmental
145 Jefferson Street, Pittsburg, TX 75686
(903) 856-5133 fax (903) 856-5134
email: rowenvironmental@hotmail.com

FACILITY LAYOUT
WASTEWATER TREATMENT SYSTEM UPGRADE

SOUTHEASTERN PROVISION
BEAN STATION, TENNESSEE

DRAWN: FHV
APPROVED: VDR
DATE: Rev 11/15/2019
SCALE: 1"=150'
FILENAME: sp site plan
DRAWING NUMBER: SP-01

SSDS SOILS INFORMATION

A soils map for the new proposed SSDS area is attached.

EXTRA HIGH INTENSITY SOILS MAPPING

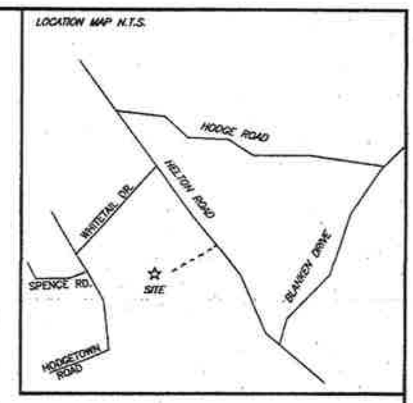
FOR

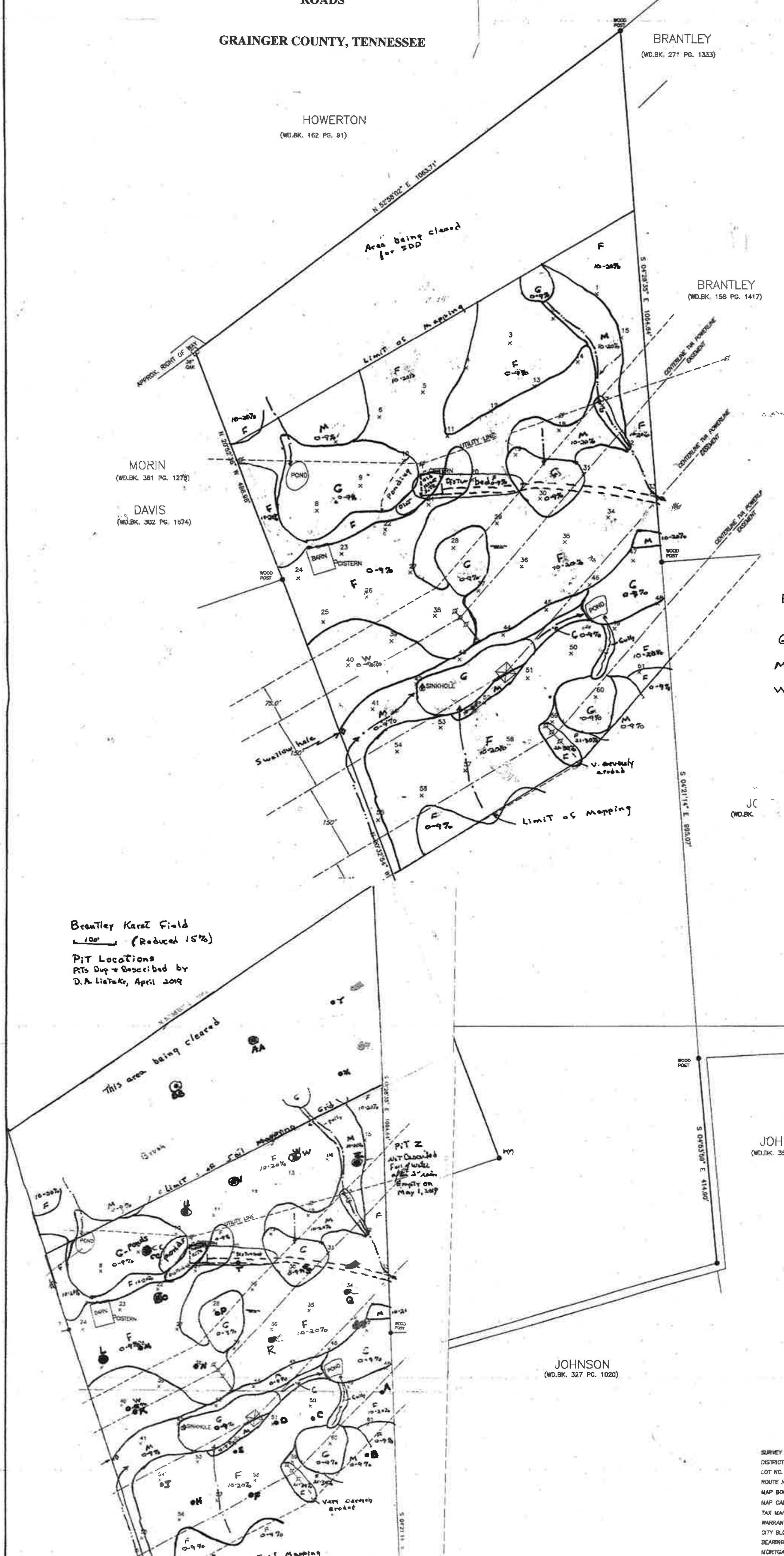
SUBSURFACE DRIP DISPOSAL SYSTEMS

PORTION OF BRANTLEY PARCEL 54

LOCATED AT HELTON AND BRANTLEY ACRES ROADS

GRAINGER COUNTY, TENNESSEE





PROPERTY IS SUBJECT TO ALL EASEMENTS, RESTRICTIONS, RIGHT OF WAYS AND ZONING OF RECORD.

THIS IS TO CERTIFY THAT THIS SURVEY MEETS THE MINIMUM STANDARDS FOR THE STATE OF TENNESSEE.

THIS IS TO CERTIFY THAT ON THE DATE SHOWN, I MADE AN ACCURATE SURVEY OF THE PREMISES SHOWN HEREON USING THE LATEST RECORDED DEED AND OTHER INFORMATION FURNISHED TO ME, THAT THERE ARE NO EASEMENTS, ENCROACHMENT OR PROJECTIONS EVIDENT OTHER THAN THOSE SHOWN.

I HEREBY CERTIFY THAT THIS IS A CATEGORY III SURVEY AND THAT THE RATIO OF PRECISION OF THE UNADJUSTED SURVEY IS GREATER THAN 1 IN 10,000 AS SHOWN HEREON.

THIS IS TO CERTIFY THAT I HAVE EXAMINED THE FEDERAL INSURANCE ADMINISTRATION FLOOD HAZARD MAP AND FOUND THE DESCRIBED IS NOT LOCATED IN A SPECIAL FLOOD HAZARD AREA.

SURVEYOR Rich L Kent

RICHARD L. KENT
R.L.S # 2040

RICHARD L. KENT REGISTERED LAND SURVEYOR XVI AGRICULTURE COMMERCE TENNESSEE NO. 2040 11-09-18

0' 100' 200' 300'

SOIL NOTES

Soil Mapping: Soils were identified using a barrel auger.
Geology: Chepultepec member of the Knox Group. Karst features are present. Sandstone strata results in higher sand content.
Color Codes:
-Soils underlined with **GREEN** have favorable properties in the upper 48 inches for subsurface sewage disposal systems.
Fullerton sandy loam
Waynesboro

Soils underlined with **RED** over **GREEN** have unfavorable and favorable properties or there is a change in the MPI rating with depth for subsurface sewage disposal systems.
Greendale sandy loam
Minvale sandy loam Complex.

Soils:
F **Fullerton.** These soils have higher sand content than is typical for this soil series, resulting in sandy loam topsoil texture. These soils also have a higher then typical iron oxide content, due to being covered by ancient alluvium at one time. Chert fragments are mostly iron oxide coated. Included in mapping are small sags where ancient alluvium (Waynesboro) has been preserved, or where cherty colluvium has accumulated (Minvale), or where topsoil has accumulated (Greendale).
G **Greendale.** Most of these soils occur in nearly level depressions or at the base of slopes where topsoil has accumulated. At some depth below the surface is Minvale colluvium. Some of these soil areas may pond for short time periods after very heavy rainfall.
M **Minvale Complex.** These soils formed in concave-shaped landform segments (shallow breached side hill depressions) where colluvium has accumulated and at the base of slopes. These soils have cherty to very cherty loam or sandy loam upper subsoil textures. The upper colluvium is underlain by Fullerton, while topsoil has filled in the lower places.
W **Waynesboro.** These soils formed in ancient alluvium, which contains some rounded pebbles. Beneath the alluvium is the more typical Fullerton soil.

Notes. Defined drainageways are shown by the appropriate symbol. Lower areas in the Minvale complex will have some overland stormwater flow during heavy rain. Greendale areas will have ponded water after heavy rains.
25-foot setback from drainageways

ANY CUTTING, FILLING OR COMPACTION WILL VOID THIS SOIL MAP

LICENSED PROFESSIONAL SOIL SCIENTIST

Th... te the site for a subsurface sewage disposal system only.

I, affirm that this soil map meets the standards established in the Regulations to Govern Subsurface Sewage Disposal, the Soils Handbook, and the Soil Taxonomy. No other warranties are made or implied. Signature of Soil Consultant does ... approval of this map by the Division of Water Resources.

High Intensity Soil Map on Portion of Tax Map 54. Completed by

David A. Lietzke, Ph.D.

Tennessee Licensed Professional Soil Scientist # 44

Date February 23, 2019

Lietzke Soil Services
1157 Spoon Hollow Road
Rutledge, TN 37861
865-828-4617
elietzke@frontiernet.net

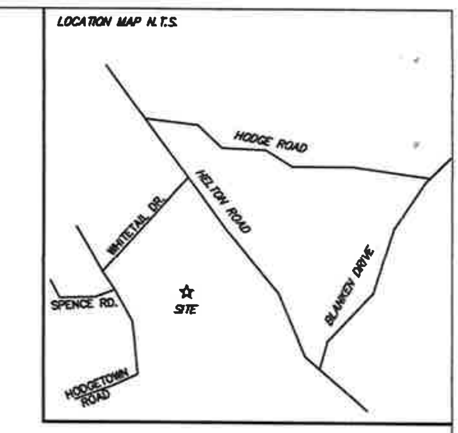
SURVEY FOR	BRANTLEY				
DISTRICT	7th	COUNTY OF	GRAINGER, TN	WITHIN THE CITY OF	WARD
LOT NO.		BLOCK		IN	
ROUTE NO.		BOX		HOUSE NO.	
MAP BOOK		PAGE		SCALE	1" = 100'
MAP CAB.		SLIDE		DATE	11-09-18
TAX MAP	51	PARCEL	54.00		
WARRANTY DEED BK.	360			PAGE	1872
CITY BLOCK NO.				DRAWN BY	RLK
BEARING BASE	TN. LAMBERT				
MORTGAGE CO.					
TITLE CO.					

A.M. SURVEYING
RICHARD L. KENT R.L.S. # 2040
4669 FOWLER DRIVE
MORRISTOWN, TN. 37814
PHONE: (423) 317-9825
FAX: (423) 317-9826

DRAWING NO. 18-065

TOPOGRAPHIC MAP OF WASTEWATER TREATMENT AND SUBSURFACE DISPOSAL SYSTEM

A topographic map for the proposed new wastewater treatment and SSDS area is attached.



PROPERTY IS SUBJECT TO ALL EASEMENTS, RESTRICTIONS, RIGHT OF WAYS AND ZONING OF RECORD.

THIS IS TO CERTIFY THAT THIS SURVEY MEETS THE MINIMUM STANDARDS FOR THE STATE OF TENNESSEE.

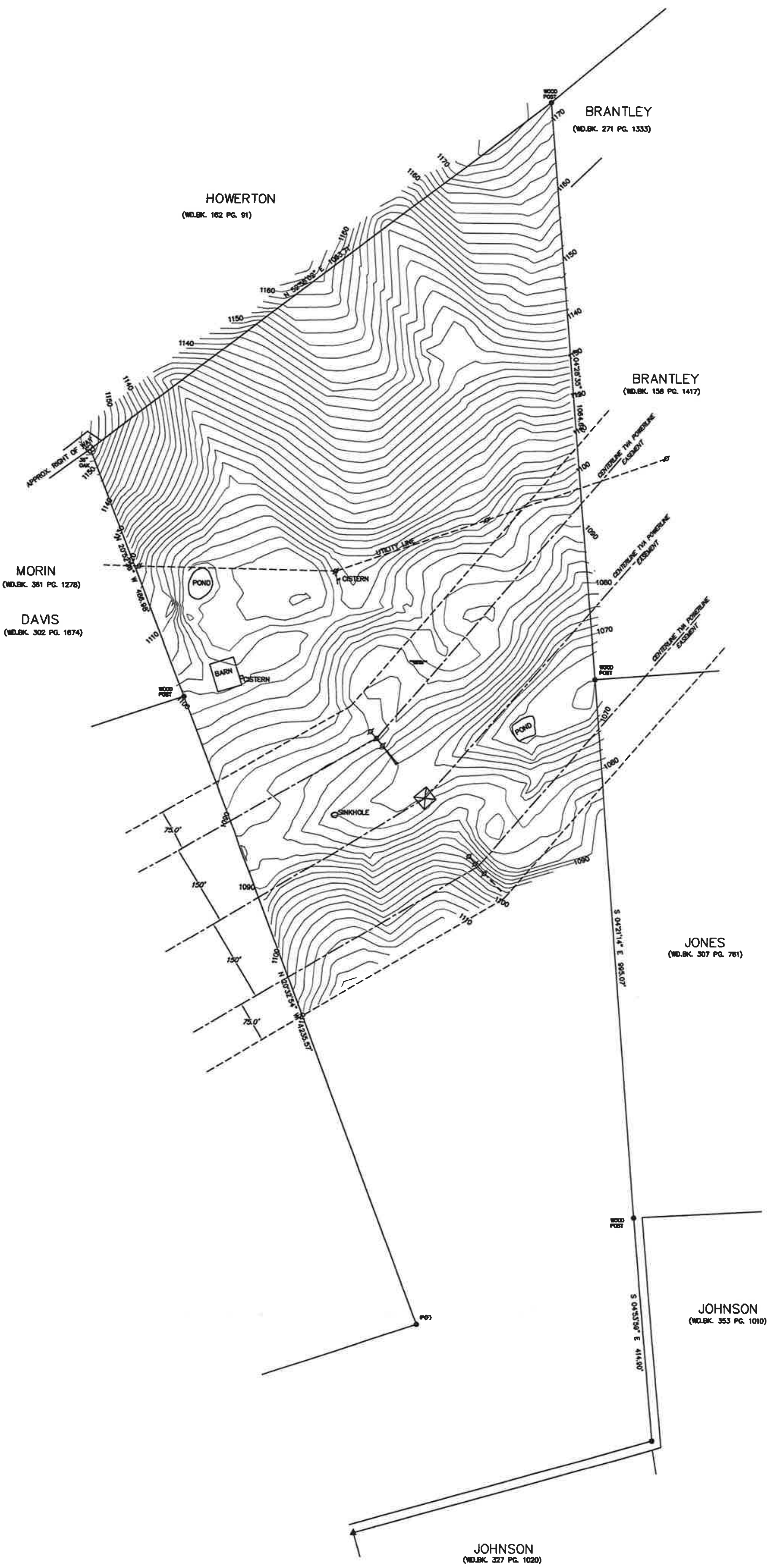
THIS IS TO CERTIFY THAT ON THE DATE SHOWN, I MADE AN ACCURATE SURVEY OF THE PREMISES SHOWN HEREON USING THE LATEST RECORDED DEED AND OTHER INFORMATION FURNISHED TO ME, THAT THERE ARE NO EASEMENTS, ENCROACHMENT OR PROJECTIONS EVIDENT OTHER THAN THOSE SHOWN.

I HEREBY CERTIFY THAT THIS IS A CATEGORY III SURVEY AND THAT THE RATIO OF PRECISION OF THE UNADJUSTED SURVEY IS GREATER THAN 1 IN 10,000 AS SHOWN HEREON.

THIS IS TO CERTIFY THAT I HAVE EXAMINED THE FEDERAL INSURANCE ADMINISTRATION FLOOD HAZARD MAP AND FOUND THE DESCRIBED IS NOT LOCATED IN A SPECIAL FLOOD HAZARD AREA.

SURVEYOR Rich L Kent
RICHARD L. KENT
R.L.S # 2040

RICHARD L. KENT — TENNESSEE NO. 2040 — 11-09-18



SURVEY FOR BRANTLEY
DISTRICT 7th COUNTY OF GRAINGER, TN WITHIN THE CITY OF ______ WARD ______
LOT NO. ______ BLOCK ______ IN ______
ROUTE NO. ______ BOX ______ HOUSE NO. ______
MAP BOOK ______ PAGE ______ SCALE 1" = 100'
MAP CAB. ______ SLIDE ______ DATE 11-09-18
TAX MAP 51 PARCEL 54.00
WARRANTY DEED BK. 380 PAGE 1872
CITY BLOCK NO. ______ DRAWN BY RLK
BEARING BASE TN. LAMBERT
MORTGAGE CO. ______
TITLE CO. ______

A.M. SURVEYING
RICHARD L. KENT R.L.S. # 2040
4689 FOWLER DRIVE
MORRISTOWN, TN. 37814
PHONE: (423) 317-9825
FAX: (423) 317-9826

DRAWING NO. 18-065

DESCRIPTION OF ALTERNATIVE APPLICATION METHODS

There is no municipal/public sewer system than can feasibly be connected to.

Surface land application of all wastewater is not feasible due to site topography and the requirements for wet weather storage. After the biological treatment system and initial drip dispersal system are completed Southeastern Provision intends to evaluate the feasibility of surface land application to reduce the hydraulic loadings to the drip dispersal areas. If it is determined surface application of a part of the treated wastewater is technically and cost effectively feasible the appropriate permit amendment process will be pursued.

The only feasible option for the facility at this time is to treat the wastewater to the required level and dispose of the treated wastewater through a subsurface disposal system consisting of a new drip dispersal system and the potential future use of the existing subsurface fields if they are determined to be acceptable for use.

DRIP DISPERSAL ADDITIONAL INFORMATION

GROUNDWATER

Historical usage of groundwater in the area has primarily been for residential and agricultural purposes. Groundwater generally flows south to southwest.

POPULATION AND CULTURAL DEVELOPMENT IN AOR

The area is primarily an agricultural setting. There are approximately 15 residential homes within the area. Land use is primarily cattle farming. Cherokee Lake is within a one mile radius.

NATURE OF INJECTED FLUID

The fluid to be managed in the subsurface disposal system will be treated wastewater from a beef processing facility. The wastewater will be treated using a physical/chemical pretreatment system followed by a biological treatment system to produce an advance treated effluent including nitrogen removal. The biologically treated wastewater will be filtered prior to being pumped to the subsurface disposal system(s). Treated wastewater will have the following characteristics:

- pH – 6 to 8
- BOD – less than 20 mg/l
- Total Suspended Solids – less than 10 mg/l
- Total Nitrogen – less than 20 mg/l
- Oil and Grease – less than 10 mg/l

TOPOGRAPHIC MAP SHOWING GROUNDWATER USAGE

A topo map with known well locations is attached.

WELL HEAD PROTECTION OR SOURCE WATER PROTECTION

The AOR is not located in a known well head protection or source water protection area. The topo maps shows the City of Morrisville, TN water system which is out side the AOR.

DESCRIPTION OF SYSTEM

The wastewater management system will consist of a physical/chemical pretreatment system followed by a biological treatment system. Biologically treated wastewater will be filtered and then pumped to the subsurface disposal system which will consist of drip dispersal with the possible future use of existing low pressure pipe and chamber areas in the future if determined to be effective. Wastewater flows at the time of preparation of this permit application are approximately 40,000 gallons per day. Flows will increase to up to 100,000 gallons per day over a period of time depending on market conditions and the number of cattle processed.

NATURE AND TYPE OF SYSTEM

The biological treatment system will be a multi-basin oxic/anoxic (Cyclic Reactor) system designed to provide significant reliability and redundancy. The biological treatment system is being designed assuming limited treatment from the dissolved air flotation pretreatment system in order to provide a very conservative design as relates to hydraulic detention time, sludge age, and aeration requirements. All pumps and blowers will be designed with full standby units. The subsurface disposal system will be designed in strict accordance with TDEC regulations as relates to materials of construction. Multiple subsurface disposal areas will be provided. This will allow flexibility in how the individual areas are operated and rested . 100 percent reserve areas will be available.