THOMAS & HUTTON

PRELIMINARY ENGINEERING REPORT

FOR:

ORANGE HILL DEVELOPMENT
RECLAIMED WATER FACILITY (RWF) AND WASTEWATER COLLECTION SYSTEM
CHARLESTON COUNTY, SOUTH CAROLINA

PREPARED FOR:
KIAWAH RESORT ASSOCIATES, L.P.

J – 25152.0100

JUNE 2023

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1.0 Description of The Project

The Orange Hill Development is on Johns Island in Charleston County, South Carolina. The property is situated between Bohicket Road and River Road. Orange Hill is approximately fifteen miles from downtown Charleston, and approximately four miles from Kiawah Island, a popular resort and golf course community. The site is comprised of roughly nine hundred thirty-four (934) acres of forested and agricultural land.

The current zoning for the subject site is a Planned Development (PD) designation under a Development Agreement with Charleston County. It is a proposed golf course community and will include up to 120 residences (homes and cottages), eighteen holes of golf, expanded practice grounds, a golf clubhouse with a grill, and a maintenance facility. Exhibit A presents a location map.

Preparation of a Preliminary Engineering Report (PER) is required by the South Carolina Department of Health and Environmental Control (SCDHEC) before a wastewater treatment plant (WWTP) can be approved for construction. This PER is to outline the wastewater treatment facilities and present a master collection system layout for Orange Hill. The plant is proposed to produce effluent meeting reclaimed water system conditions. So, the plant will be a Reclaimed Water Facility (RWF). The intent is to use the treated effluent in a beneficial way and reduce irrigation water from other sources. Effluent will meet requirements shown in SCDHEC Regulation 61-9, Section 505 and will provide effluent exceeding the prior treatment proposal where it had been proposed to be a secondary level plant. The effluent will be blended with other water sources to irrigate the golf course and practice grounds. So, the effective water quality applied to the course will be even further diluted with other water sources.

The PER is prepared in accordance with the requirements of the South Carolina Code of Regulations 61-67, Standards for Wastewater Facility Construction. This report's main goals are:

1) Estimate wastewater flows.
2) Discuss the type of wastewater.
3) Layout a preliminary design for the proposed wastewater treatment.
4) Discuss sludge processing and effluent disposal.
5) Define limits of service for the RWF and conceptual collection system.

The report follows the outline of the contents that SCDHEC requires for Preliminary Engineering Reports (PER) as listed in Section 67-200 of Reg. 61-67

1.1 Owner

Orange Hill is owned by a single entity who will construct the plant and collection system and at some point, turn its operation over to the Property Owners Association (POA). The wastewater treatment plant and collection system will be initially owned by:

Kiawah Resort Associates, L.P.
Contact: Ray Pantlik
1 Kiawah Island Parkway
Kiawah Island, SC 29455
(843) 814-3418

1.2 Need for the Project

The development is located outside an urban boundary of where traditional wastewater service is available. The project is also located far from existing or proposed wastewater treatment and disposal systems but still needs wastewater service. The Orange Hill development has been identified for over 20 years as a PUD in Charleston County with sewage service provided by a wastewater treatment plant owned, operated, and maintained by the POA (Property Owners Association). See Exhibit G for prior PUD language. Wastewater service is needed for the development.

Several options are available for wastewater service:

1. No Treatment Plant Action – The no action option would rely on wastewater service by septic tanks or similar onsite treatment and disposal systems. Due to the intensity and clustering of development in some areas this is not a feasible solution to serving the entire property. However, it may be an option for portions where the lots are large and spaced out with suitable site conditions.
2. Regionalization – There are no available regional alternatives in the vicinity. Nearby treatment plants which are not regional facilities, have a limited-service boundary and no available capacity.
3. Construct an Aerated Lagoon System – This alternative consumes a significant land area and only provides secondary treatment unless additional measures are taken.
4. Installation of a Package Plant – Another alternative is to purchase and install a package plant. This alternative allows a small footprint so it is well buffered from wetlands and adjacent properties and will provide a superior effluent water. This alternative has been selected for the past twenty plus years as the best alternative.

To provide excellent treated effluent water quality, the package plant option was selected and is consistent with planning over the past 20 years. It will ensure proper wastewater service is provided for development.

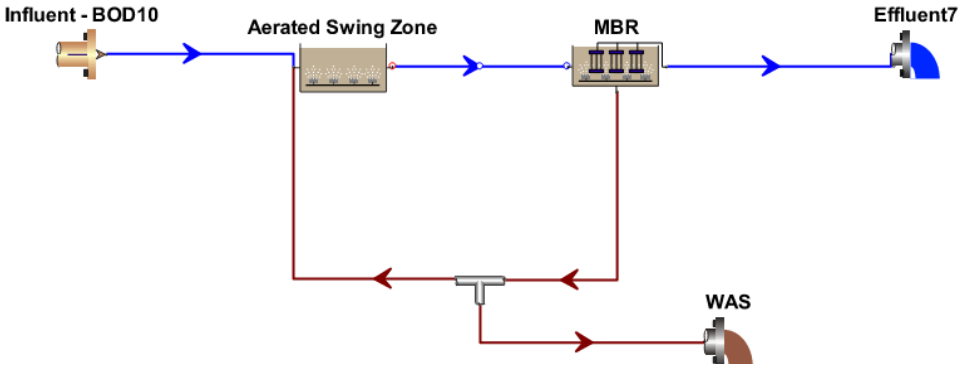
1.2.1 Treatment Process Selection

Several different treatment processes were considered. Budget proposals from five (5) manufacturers/vendors of treatment systems best suited for the target flow were reviewed. Based upon advantages/disadvantages, effluent water quality, reliability, and cost, the membrane bioreactor (MBR) treatment system from Kubota was selected. The MBR treatment process treats effluent to reclaimed water standards.

1.3 Proposed New Wastewater Treatment Process and Effluent Disposal Method

Several types of processes were reviewed, and the membrane bioreactor (MBR) technology was chosen, since it will best meet the project goals. The Orange Hill Development WWTP will be constructed using membrane bioreactor (MBR) treatment technology designed to effectively treat raw wastewater and achieve effluent quality suitable for high quality irrigation or reclaimed uses. The proposed package plant MBR system includes treatment trains containing a swing zone/equalization tank. This will be followed by two membrane tanks. The swing zone will have a variable side water depth to accommodate low initial flow and varying inflows. Wastewater will be pumped from the swing zone to the different MBR basins. Return Activated Sludge (RAS) from the MBR basins will flow by gravity back to the swing zone. The Waste Activated Sludge (WAS) will be pumped to a sludge holding tank, then fed to a gravity dewatering system.

Figure 1-1 demonstrates the proposed process flow diagram of the Orange Hill Development WWTP.



The raw wastewater (influent) from the development collection system will be transferred to the proposed treatment plant headworks facility. The headworks facility will include a 2-mm internally fed drum screen to remove fine debris and grit that could accumulate in the downstream treatment process and cause excessive wear and damage to the membranes. The MBRs produce a high-quality effluent (permeate) that can be used for irrigation and will meet reclaimed water standards. Kubota membranes are preferred for this project since they have the most proven reliable service and can meet low flow conditions.

Ultraviolet (UV) disinfection will be applied to the MBR permeate and the treated effluent water will be pumped to a 2.5-million-gallon (MG) storage tank. This storage tank will also be fed by well water, purchased water, and lagoon water. All waters will be blended and serve as golf course irrigation water.

The WAS (Waste Activated Sludge) will be pumped from the MBRs to a digestor/sludge holding tank. The tank's contents will be aerated to minimize odors. The contents of the tank will be dewatered by a gravity dewatering box(es). Polymer will be added to the solids before the contents enter the dewatering box(es). The dewatered solids will be loaded from the dewatering system (Aquacat/Polycat) hopper and hauled offsite for landfill disposal at the Oakridge Subtitle D Landfill (Waste Management) in Dorchester, SC. A letter from the landfill management agreeing to accept the biosolids cake is attached.

An odor control system will be provided if needed to collect and treat foul odors generated in the headworks and sludge holding tank. The odor control system will use a biofilter with media and associated ducts. The treated air will be released into the atmosphere. Exhibit B shows a process flow diagram for the treatment and disposal process.

1.3.1 Influent Screenings

The wastewater collected from the Orange Hill Development service area will consist of residential wastewater with no industrial flows. The raw wastewater from the Orange Hill Development collection system will be pumped to the proposed treatment plant headworks (screen structure and equalization (EQ) tankage). The headworks facility will remove debris and some grit that could accumulate in downstream treatment process and cause excessive wear and operational damage.

Screens are required in treatment facilities to protect downstream equipment such as pumps and mixers, and to reduce debris accumulation in the sludge. The design criteria for the screening facilities are presented in **Table 1-1**. Screens will be located upstream of the equalization tanks.

TABLE 1-1
Influent Screening Criteria

Parameter	Design Value
Number of Units	1 Duty / 1 Standby
Type	Automatic Fine Screen
Model	Kubota Internally Fed Drum (10HP each) or CleanTek Roto Sieve Drum Screen
Screen Opening	2 mm

The influent flow will enter into a single unit duty screen at the entrance of the headworks structure via a force main. A bypass line will be installed to divert the influent flow to either of the equalization tanks in case of maintenance to the screens. The screens will be designed to operate continuously handling the peak design flow and to be self-cleaning.

Screenings will discharge through a discharge chute and into a covered hopper to minimize organic contents and thus prevent odors. The wash water from the screening process will drain into the equalization tanks or to the plant drain pump station.

Screenings Disposal

The screenings will be collected in an enclosed roll-off box adjacent to the headworks structure. The roll-off box will have the capacity to hold its contents for several days, after which the contents will be hauled offsite for disposal.

The odorous air will be drawn off the odor control system. The screenings dumpster, located on the ground level, will also have the odorous air captured and sent to the odor control system.

1.3.2 Flow Equalization (EQ)

Flow Equalization (EQ) Tankage will be designed to store incoming wastewater during peak flow periods to be treated during low flow periods so that the treatment system receives constant inflow. The EQ tanks will be connected to pumps that will be limited to pumping the design flow per hour to the treatment process. The wastewater system flow meter will be installed on the discharge line of this pump station and will be the basis for the control panel to limit the hourly flows. Flows more than the treatment process capacity will be stored and treated during periods when wastewater generation is less. The flow equalization tanks will also be useful for storing wastewater should the treatment system need to be taken offline for a brief period to perform repairs or replacement.

The wastewater system design includes flow equalization to maintain a consistent inflow to the treatment process and includes another 50% safety factor.

Flow equalization tanks will be sized based on the following design criteria:

- Design Flow = 40,000 gpd
- Minimum Equalization Volume = 16,000 gallons
- Minimum Tank Size = 4,000 gallons
- Proposed Tank Sizes = one 12,000-gallon tank and two 4,000-gallon tanks
- Figure 1-2 shows the equalization storage needs

Two 4,000-gallon single compartment flow equalization basins inside one tank are proposed for the application initially. They will function as a dual compartment septic tank until inflows reach a consistent 1,500 gpd. Then the wastewater will be sent directly to the treatment process. These tanks will be repurposed as part of the total equalization (EQ) storage. The septic tank effluent water quality will provide partial treatment. This flow up to 1,500 gpd is proposed to be blended with the other golf course irrigation water storage sources.

1.3.2.1 Flow Equalization Tank Pump

The Flow Equalization Pump Station (FE-1) or transfer pump will be a duplex, alternating lead/lag pump station. By limiting the hourly flow from this pump station, as discussed above, the downstream treatment processes will see consistent flow, as best as possible, throughout the day and into the night, rather than processing surge loads followed by periods of rest. Treatment processes function well with a steady flow.

Submersible pumps are proposed for this application. The flow will limit the influent flow rate to the treatment process to approximately 28 gpm.

FIGURE 1-2

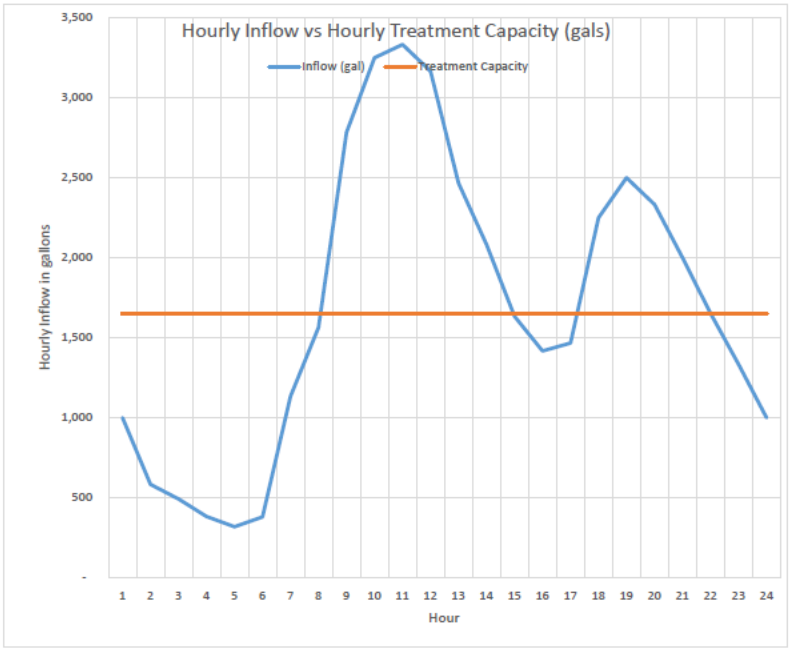
Equalization (EQ) Tank/Basin Design
Orange Hill WWTP Volume Calculation 40,000 gpd treatment capacity total

Time	Variable Flow Factor Option 1	Variable Flow Factor Option 2	Variable Flow Factor Option 3	Diurnal Flow Ratio to ADF	Base Flow	Hourly Inflow (gal)	Cumulative Inflow	Cumulative Average Hourly Flowrate	Average Hourly Treatment Flowrate (gal)	Difference Inflow vs treatment (gal)	Volume above treatment capacity (gal)
Midnight	0.45	0.22	0.40	0.600	1.00	1,000	1,000	1,650	1,650	(650)	
1	0.43	0.56	0.38	0.350	1.00	583	1,583	3,300	1,650	(1,067)	
2	0.41	0.60	0.35	0.295	1.00	492	2,075	4,950	1,650	(1,158)	
3	0.42	0.52	0.35	0.230	1.00	383	2,458	6,600	1,650	(1,267)	
4	0.45	0.42	0.40	0.191	1.00	318	2,777	8,250	1,650	(1,332)	
5	0.53	0.67	0.50	0.228	1.00	380	3,157	9,900	1,650	(1,270)	
6	0.74	0.83	1.00	0.680	1.00	1,133	4,290	11,550	1,650	(517)	
7	1.02	1.13	1.45	0.938	1.00	1,563	5,853	13,200	1,650	(87)	
8	1.10	1.46	1.45	1.670	1.00	2,783	8,637	14,850	1,650	1,133	
9	1.09	1.48	1.35	1.950	1.00	3,250	11,887	16,500	1,650	1,600	
10	1.04	1.41	1.20	2.000	1.00	3,333	15,220	18,150	1,650	1,683	
11	0.98	1.35	1.10	1.900	1.00	3,167	18,387	19,800	1,650	1,517	
12	0.90	1.30	1.05	1.480	1.00	2,467	20,853	21,450	1,650	817	
13	1.02	1.19	1.00	1.250	1.00	2,083	22,937	23,100	1,650	433	7,183
14	1.13	1.07	1.00	0.980	1.00	1,633	24,570	24,750	1,650	(17)	
15	1.27	1.11	1.10	0.850	1.00	1,417	25,987	26,400	1,650	(233)	
16	1.45	1.20	1.20	0.880	1.00	1,467	27,453	28,050	1,650	(183)	
17	1.70	1.28	1.40	1.350	1.00	2,250	29,703	29,700	1,650	600	
18	1.97	1.37	1.55	1.500	1.00	2,500	32,203	31,350	1,650	850	
19	2.10	1.29	1.60	1.400	1.00	2,333	34,537	33,000	1,650	683	
20	1.55	1.16	1.50	1.200	1.00	2,000	36,537	34,650	1,650	350	2,483
21	0.97	0.97	1.20	0.990	1.00	1,650	38,187	36,300	1,650	-	
22	0.72	0.77	1.00	0.800	1.00	1,333	39,520	37,950	1,650	(317)	
23	0.54	0.64	0.7	0.600	1.00	1,000	40,520	39,600	1,650	(650)	
						40,520				920	9,667 Total

Projected Ultimate Flow (ADF)	40,000	gpd	
Minimum EQ Volume Required	10,587	gallons	
Contingency EQ Volume	5,293	gallons	50%
Total EQ Volume	15,880	gallons	
EQ Volume Provided	16,000	gallons	

Provide

Each	Gallons/each	Total Gallons
2	2,000	4,000
1	12,000	12,000
EQ Volume Provided		16,000



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1.3.3 Treatment Process

The screened wastewater will flow to Equalization tanks where the inflow will be dampened before going out to the swing zone basin.

Kubota uses a Submerged Membrane Unit (SMU). The membrane sheet is made from chlorinated polyethylene, has an average pore size of 0.2 micron, is much thicker than other membranes to provide long-lasting durability, and features high porosity to enable high flow. The MBR treatment process is capable of meeting strict nutrient removal requirements while still maintaining a small footprint. Each MBR is the combined process of activated sludge (secondary treatment) and membrane filtration (tertiary or reclaimed treatment). Membrane units are installed in the activated sludge reactor, where sludge and treated water are separated by means of physical filtration. Other treatment processes, such as conventional activated sludge, require gravity sedimentation using final clarifiers. MBRs eliminate the need for gravity sedimentation, thereby eliminating the need for final clarifiers.

The treated permeate from the membranes will then be disinfected by ultraviolet (UV) light to kill or inactivate any potential microorganisms, then finally pumped to the golf course irrigation water ground storage tank. The effluent water will be blended with other waters and used as part of the total water needed for golf course irrigation thereby using this effluent resource in a beneficial way.

The waste-activated sludge (WAS) will be pumped from treatment tanks to a sludge holding tank where the biosolids will be stored before further processing or disposal. From there the sludge will be pumped to a dewatering system hopper (or it will be piped to pump directly to the dewatering hopper). The hopper's contents will be dewatered by gravity. Polymer will be added to the solids before the contents enter the hopper to increase the dewatering capability of the solids. The dewatering hopper is a roll off container lined with filter fabric with an underdrain system. Residual water will be conveyed to the plant drain pump station then returned as influent to the EQ tank. The roll off container with dewatered biosolids will be hauled to a local landfill for ultimate disposal.

Influent Design Flow

The proposed treatment system is designed with the capacity of treating the following Design Flow:

TABLE 1-2
Design Flow Conditions

Condition	Ultimate Design Flow (Average Day Flow -ADF)	Unit
Build out Design Flow	40,000	gpd

The treatment plant will be designed based on a reasonable assumption of domestic wastewater properties. Since this is a new development, historical wastewater characteristics are not available. Therefore, the anticipated effluent concentrations are based on the historical data of similar systems and textbook valves. Table 1-3 presents influent data and expected effluent characteristics.

TABLE 1-3 Influent and Effluent Characteristics		
Constituent	**Assumed Influent Concentration**	**Anticipated Effluent Concentration (1)**
BOD	250 mg/L	< 5 mg/L
TSS	250 mg/L	< 5 mg/L
TKN	40 mg/L	< 9 mg/L

(1) Meets Tertiary or Reclaimed Water Standards

A MBR system offers a "safe" reliable alternative to conventional treatment processes which may have a higher BOD, higher nitrate/phosphate levels, and more amounts of suspended solids discharge into the effluent holding storage, which will be eventually used for irrigation. This results in irrigation system problems. Kubota systems also are a viable alternative to the typical high-profile open top "package treatment plant" which can produce repugnant odors and are sometimes impacted by heavy rainfall events.

MBR Benefits:

- Thoroughly evaluated
- Easily expanded
- Small footprint
- Energy-efficient
- Easy installation
- Positive pump discharge
- Automatic control system
- Monitoring 24 hours
- Noncorrosive parts
- Able to properly treat low flow conditions
- Tertiary or reclaimed effluent water quality

1.3.4 Disinfection

Disinfection of the permeate (or treated tertiary level effluent) will be by ultraviolet (UV) light. UV uses the electromagnetic energy from mercury lamps to kill or inactivate microorganisms in the wastewater. UV light provides rapid, effective inactivation of microorganisms. The design dose will ensure that the effluent receives a minimum UV transmittance of 65% at peak flow. The dosage shall be calculated at the end of lamp life (defined as a lamp at 80% of a new lamp). An inline UV system will follow the permeate pumps. There will be at least two duty units and one standby UV unit for a total of three units.

1.3.5 Effluent/Land Application Storage

The SC DHEC requires 7-day effluent storage for a land application system. A 2.5 MG ground storage tank is proposed to provide more than 7 days of effluent storage and to use as storage for golf course irrigation water. The effluent transfer pump station will convey the disinfected effluent that satisfies reclaimed water quality limits to this 2.5 MG ground storage tank.

The tank construction will be as described below. Manways will be provided for maintenance and inspection access at ground level. A drainpipe will be provided for maintenance.

TABLE 1-4
Storage Tank Basis of Design
Golf Course Irrigation Water

Parameter	Design Value
Storage Tank:	
Tank Construction	Pre-Stressed Concrete or Glass-Fused Steel Bolted
Number of Tanks	One – 2.5 MG
Manufacturer	Crom Tank, PreCon or Florida Aquastore Tank
Tank Volume	2.5 MG
Time to Empty	At Avg. Flow 75 hrs Or 3.2 Days At Low Flow 119 hrs or 5 days
Diameter	120 ft
Side Water Depth	29.5 ft

The level in the storage tank will be monitored by an ultrasonic level element located on top of tank. A signal will be transmitted to the plant control system. If the tank is at High Level, an alarm will sound, and the operator will be notified by the SCADA system communication method. Similar steps apply for a low level condition.

1.3.6 Effluent Transfer Pump Station

1.3.6.1 Process Description

The effluent transfer pump station will send the treated effluent to the irrigation water ground storage tank for the golf course irrigation. The pump station will consist of two reuse transfer pumps.

The transfer pump sizing was based on a maximum pressure of 55 psig at the treatment plant site. The pump may be vertical turbine "can" pumps

with above grade discharge or submersible pumps. The pump will have variable speed drives (VFD).

TABLE 1-5 Effluent Transfer Pump Station Design Criteria & Preliminary Equipment Sizing	
Parameter	**Design Value**
Number of Units	2 (1 duty, 1 standby)
Type	Vertical Turbine in cans or submersible
Capacity for Each Pump	30 gpm @ 127 ft TDH
Minimum System Pressure	55 psig

1.3.6.2 Control Strategy

The transfer pumps when on, will normally operate automatically to maintain a set flow rate. The pumps will also adjust their speed to maintain the flow. Flow will be monitored from a Flow Indicator (FI) to the common discharge header. As the system demands increase past the capacity of the first pump, the second pump will be started at low speed to boost the flow. The speed of the pump will be increased to meet the pressure and flow requirements.

1.3.7 Flow Measurement Sampling

1.3.7.1 Flow Measurement

The amount of wastewater treated will be measured and recorded at various points for monitoring purposes.

TABLE 1-6 Flow Monitoring Provisions		
Flow Stream	**Location**	**Method**
Raw Wastewater	Influent Line	Magnetic Flow Meter
Transfer Pumps	Transfer to Swing Zone	Magnetic Flow Meter
WAS	WAS Pump Discharge	Magnetic Flow Meter
Effluent Transfer Pump Station	Transfer Pump Station	Magnetic Flow Meter

1.3.7.2 Flow Sampling

A automatic 24-hr composite sampler will collect samples at one sampling point. Influent sampling will be a grab sample provided to characterize the

raw wastewater quality, determine associated treatment, and process control measures. Samples will be collected downstream of the screens. The other sampling point will be on automatic sampler downstream of the MBR basins just before flow enters the effluent transfer pump station. Additional sampling will be done at various locations throughout the treatment process by the operator.

TABLE 1-7
Flow Sampling Provisions

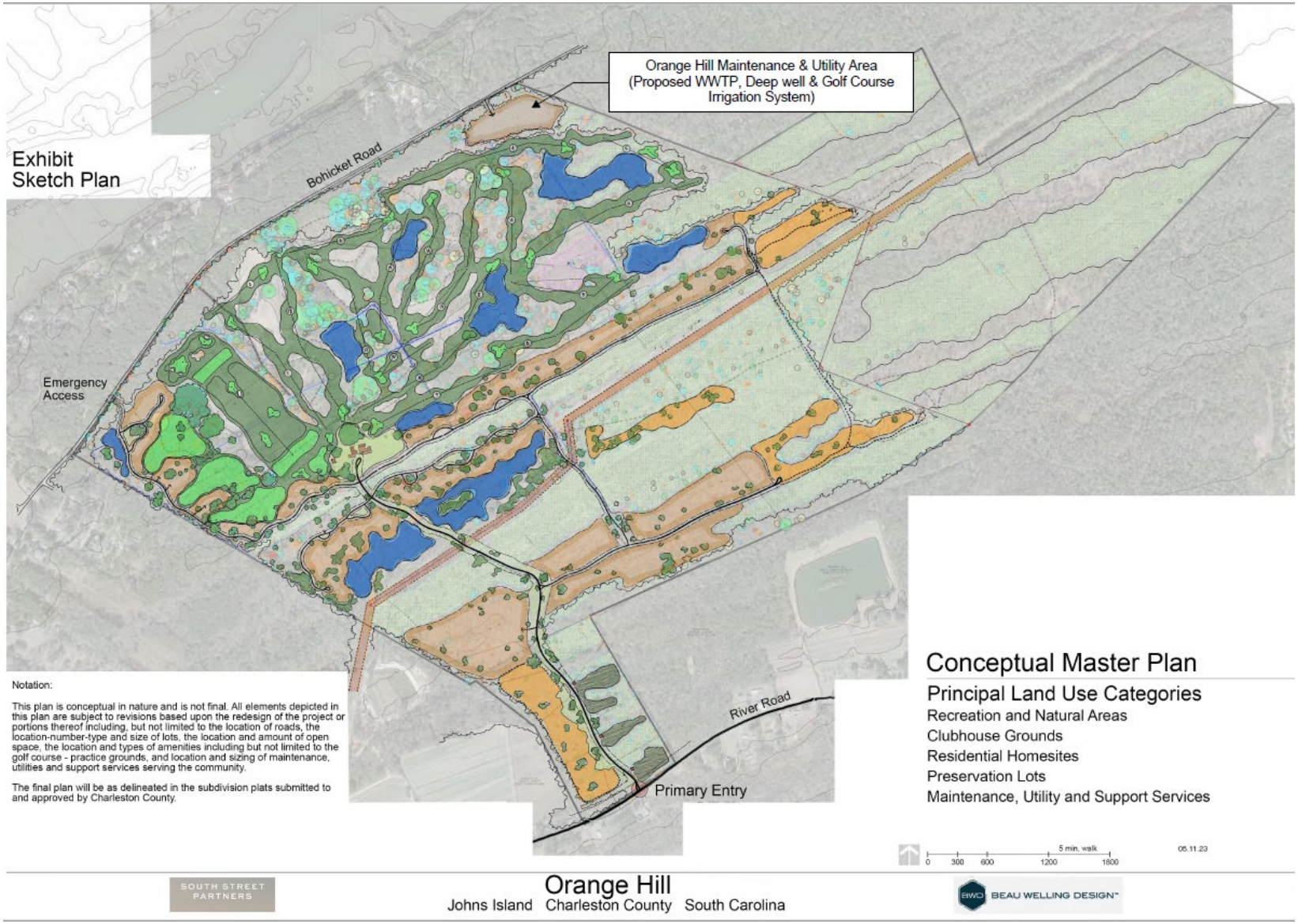
Flow Stream	Location	Method
Raw Wastewater	Screens	Grab
Plant Effluent	Before Irrigation Storage	Automatic Composite
Dissolved Oxygen	MBR Basins	DO Sensor

1.3.8 Groundwater Monitoring Wells

The effluent is high quality and will be blended with other irrigation waters. Since the total max. effluent flow is less than 10% of the average irrigation demand of 500,000 gpd monitoring wells are not proposed. The total area to be irrigated is 115 acres.

(1) Figure from golf course superintendent.

Figure 6 shows the proposed golf layout.



1.3.9 Support Facilities

The proposed plant is in the maintenance area and utility track where golf course maintenance, office, storage, restroom facilities, and such will be located. The intent is to use the nearby facilities to support the treatment plant personnel and operations as much as possible.

1.4 Phasing

Typical of new development, wastewater flows will be low during the initial years and a wastewater treatment facility designed for ultimate flow will not operate properly. This facility will be constructed in phases to provide better treatment, operation, and maintenance as more units are connected and the flow increases over time. The MBR technology proposed for this facility is readily adaptable to "modular" construction and is, therefore, an ideal choice for this application. The phasing plan for this facility consists of three phases as described below.

During the early portion of the development, actual flows will be small and sporadic. To manage and process the varying small inflows until those flows become substantial and consistent, a temporary onsite two compartment septic tank arrangement will be used. Once the inflow is sustained at 1,500 gpd, this temporary tank will be repurposed to serve as part of the equalization storage and all flows will go to the swing zone in the MBR plant.

1.4.1 Phase 1 (0 to 1,500 gpd)

The intent of this phase is to construct facilities necessary for initial low flows until incoming flows increase and are steady. The following process units will be constructed initially:

- Influent pumping (from the offsite pump station)
- Equalization (EQ) storage tanks (2 tanks purposed as septic tanks initially)
- Splitter box
- Primary screens
- Effluent and golf course irrigation water ground storage tank (2.5 MG)
- Operations building (blowers, pumps, chemical feeders, electrical/controls, operations office)
- Emergency generator
- Effluent Disinfection system
- Effluent transfer pumps
- Golf course irrigation system to disposal of effluent
- Treated effluent irrigation pump station (blend with other water sources) and to water the golf course
- Two EQ tanks will initially serve for treatment

1.4.2 Phase 2 (1,500 to 20,000 gpd)

The second phase of construction increasing the plant capacity to 0.2 mgd will consist of installing the package MBR system (Swing Zone and MBR Basins) from Kubota. Membranes will be installed for a treatment capacity of 0.2 mgd. The two EQ tanks initially functioning as a septic tank will be repurposed to function as equalization. At least one AquaCat dewatering box will be installed. Further, a sludge storage tank and polymer feed system are planned.

1.4.3 Phase 3 (20,000 to 40,000 gpd)

The final phase of plant construction will increase the plant capacity to 0.4 mgd and it will be completed before the Average Day Flow (ADF) reaches 0.20 mgd. Additional membranes will be added to increase treatment capacity. A second AquaCat dewatering box and odor control system will also be installed. Some or all of Phase 3 improvements may be installed in Phase 2 depending upon the rate of incoming wastewater flow increases, market conditions, and operator input.

2.0 Description Of Wastewater

Wastewater from the Orange Hill Development service area will be entirely residential wastewater with typical domestic strength. No industrial flow is anticipated.

3.0 Characteristics of the Wastewater

3.1 Type of Wastewater

Wastewater generated from the Orange Hill Development will be domestic from residential areas and the golf clubhouse.

3.2 Wastewater Flows

Table 3-1 presents the estimated wastewater flows for the development buildout for the uses permitted using SCDHEC unit contributors loading (UCL). The flow projection at buildout is 40,000 gpd. Water-saving plumbing fixtures (low-water usage showerheads, toilets, faucets, etc.) will be required in the development.

TABLE 3-1
Plant Influent Flow Based on Unit Contributory Loading

Type of Establishment	Unit	Quantity	Unit Hydraulic Loading (gpd)	Total Hydraulic Loading (gpd)
Residences	House/Cottages	120	300	36,000
Golf Course Club House	Per Player	150	10	1,500
Dining at Grill Not twenty-four-hour restaurant, not fast-food type, not drive-in, not walk-up deli)	Per Person	40	53	2,120
Golf Club + Support Offices (Business)	Per Person	10	19	190
Golf Maintenance	Per Person	10	19	190
Total Estimated Hydraulic Loading				**40,000**

3.3 Wastewater Characteristics

Typical anticipated wastewater characteristics concentrations based on textbook values and concentrations from similar projects are shown in ***Table 3-2***.

TABLE 3-2
Typical Anticipated Domestic Wastewater Concentrations

Type	Amount
Solids	
Settleable	10 mg/L
Suspended	210 mg/L
Fixed	50 mg/L
Volatile	160 mg/L
Dissolved	500 mg/L
Fixed	300 mg/L
Volatile	200 mg/L
Strength of Wastewater	
BOD_5	190 mg/L
COD	430 mg/L
TOC	140 mg/L
Color	
Domestic in nature, so color is not anticipated other than typical gray.	
pH	
Range	6.8 to 7.5
Alkalinity	
Total @ $CaCO_3$ expected	> 100 mg/L
Heavy Metals	
Heavy metal, noxious, toxic, or hazardous compounds not expected to be found.	
Biological Degradation	
Materials resistant to biological degradation are not expected.	
Surfactants	
Domestic in nature. Surfactants, such as Methylene Blue Active Substances, or Others, are not expected.	
Phosphorus	
Total	7 mg/L
Organic	2 mg/L
Inorganic	5 mg/L
Nitrogen	
Total	40 mg/L
Organic	15 mg/L
Free Ammonia (NH_3-N)	25 mg/L
Nitrites	0
Nitrates	0

Textbook values based on Metcalf and Eddy, 2003
BOD_5 = 5-day biochemical oxygen demand
COD = Chemical oxygen demand
TOC = Total organic carbon

4.0 Treatability of Waste

Since the influent stream will consist of residential waste, the flow should be like other communities in South Carolina, North Carolina, and Georgia close to the coast. Wastewater characteristics from these communities are consistent with those presented in Table 3-2 and conventional treatment facilities for these communities range from activated sludge to aerated lagoon to membrane bioreactor (MBR). The MBR process was selected to provide a high-quality or reuse effluent.

The treatment system will be designed to meet the following treatment levels shown in **Table 4-1**. This exceeds the standards for land application of treated effluent and will meet reclaimed water standards.

TABLE 4-1
Anticipated Effluent Concentration

Parameter	Concentration / Quantity (1)
BOD_5 (Biological Oxygen Demand)	< 5 mg/L
TSS TN (Total Suspended Solids)	< 5 mg/L
TN (Total Nitrogen)	< 9 mg/L
Fecal	< 14/43

(1) Exceeds Maximum Levels for Effluent Land Application and Meets Reuse Standards

5.0 Sludge Removal and Disposal

The treatment process generates sludge which will need to be disposed of. It is proposed that sludge be dewatered by gravity and then transported to a landfill for disposal (such as the Oak Ridge landfill in Dorchester County).

5.1 Process Description

The solids handling facility will consist of aerated sludge holding tank (aerobic digester), waste activated sludge pumps (WAS), sludge feed pump to gravity drain hoppers and a polymer feed system.

The WAS will be pumped from the MBR basins to the aerated sludge holding tank. The sludge holding tank will consist of one 9,000-gallon tank. It is anticipated that the total volume of the tank will store approximately 15 days of thickened WAS. The expected volatile solids destruction will be insignificant. The sludge will then be mixed and aerated in the tank to prevent odors and to produce a homogeneous mixture prior to dewatering. To maximize storage capacity while maintaining the ability to provide oxygen to the aerated sludge holding tank, a maximum stored suspended solids concentration of 1.5 percent will be used. The WAS concentration entering the tank is approximately 0.7 to 1 percent TSS. Therefore, thickening of the WAS will be required by frequent settling and supernating practices.

The sludge from the aerated sludge holding tank will be dewatered using two gravity dewatering boxes. Polymer will be added to the solids before being fed to the dewatering boxes to increase the dewatering capability.

Dewatered sludge will then be loaded onto a truck and hauled to a landfill.

5.2 Waste Activated Sludge (WAS) Pumps

The MBR System will have WAS pumps to transfer liquid to the sludge holding tank. Another set of pumps will convey the sludge holding tank contents from the aerated sludge holding tank to the dewatering boxes. Two sludge pumps capable of pumping 5 gpm.

WAS Pump Design Criteria and Preliminary Equipment Sizing

Parameter	Design Value
Number of Pumps	1 duty + 1 standby
Type	Submersible or dry pit
Capacity for Each Pump	5 gpm @ 35 ft TDH
Motor	1.5 HP

5.3 Aerated Sludge Holding Tank (Aerobic Digester)

The WAS will be pumped into the aerated sludge holding tank. The volume of the tank is 9,000 gallons and it is sized for build out conditions. Tank sizing calculations are shown in Exhibit J.

The mixing and aeration system will consist of a fixed coarse bubble diffuser system, a 30 HP positive displacement blower package, sludge transfer pump, decanter, and level sensor.

TABLE 5-1
Design Criteria for Aerated Sludge Holding Tank

Parameter	Design Value
Number of Tanks	One (1)
Tank Volume	9,000 gallons
Solid Retention Time	15 days
Transfer Pump Capacity	5 gpm @ 35 ft TDH
Motor	1.5 HP
Number of Blowers	One (1)
Mixing Blower Motor	Positive Displacement

5.4 Dewatering

The sludge in the aerated sludge holding tank will be pumped to one of the two 15 CY dewatering boxes. A polymer blending feed system will be provided to enhance dewatering.

Drain waters will flow by gravity to the plant drain pump station. Two gravity drain hoppers will be provided so when one is removed to empty another one is available. The initial phase will only have one hopper.

The waste-activated sludge (WAS) will be pumped to a sludge holding tank (or directly to a dewatering hopper) and then to a dewatering hopper with polymer added to facilitate dewatering. Dewatered sludge will then be disposed of at a landfill. Filtrate will be drained to the onsite plant drain pump station where it will be sent back to the headworks for processing. Sludge will be pumped to at least two 15-yard Aquacat by Park Process or similar arrangement where it can gravity dewater. Dewatering will be facilitated by adding polymer from a 330-gallon or 500-gallon Polycat polymer mixing tank and a polymer pump.

Coordination has begun to dispose of sludge at Oakridge Subtitle D Landfill (Waste Management) in Dorchester, SC, or Charleston Water System's Plum Island WWTP. See Exhibit E.

The estimated WAS from an MBR plant is 0.7 lbs. WAS/lb. BOD = 60 lbs. of WAS per day. (BOD = 250 mg/L). 60 lbs. per day from MBR at 12,000 mg/L gives 600 gallons per day of WAS sludge (build out).

5.5 Control Strategy

With MBR, a small portion of mixed liquor suspended solids (MLSS) will be transferred to aerated sludge holding tank as waste activated sludge (WAS). The tank is equipped with a float switch level sensor as well as a submersible pressure transducer. The tank level is communicated to plant SCADA system panel. The blower will be operated manually by the operator. The SCADA panel will also receive a Low-level signal from the level transmitter for the tank, which automatically stops the blower.

The WAS transfer pump will be controlled through an operator interface and PLC mounted control panel which is part of the equipment package. The control panel will be located adjacent to the Park Process Polycat Batch Polymer Blending and Injection System. The System includes:

- Polymer Tank
- Agitator on Mix Tank
- Polymer Injection Pump

The polymer blend system will be controlled locally through a local control panel provided with the polymer blend equipment package. The PLC controls the polymer blend system via signals for run enable and flowrate setpoint. The polymer blend system will automatically control the speed of the liquid polymer feed rate pump and dilution water control valve position to maintain the locally adjusted polymer solution concentration.

6.0 Odor Control System

6.1 Process Description

Foul-air capture and treatment will be implemented at the plant to minimize odor complaints, mitigate corrosion, and promote a more pleasant work environment. Odor control will be implemented for the primary screens, equalization tanks, and sludge holding tank.

6.2 Process Unit Ventilation Rates

Air exchange rates- for unoccupied non-aerated areas, acceptable air exchange rates range between 6 and 12 air changes per hour (AC/hr). Foul air stream average and peak vapor hydrogen sulfide (H_2S) concentrations were predicted to average 25 parts per million per volume (ppmv).

Process Area Ventilation Rates
(to prevent lethal concentration and to meet NFPA 70/820 requirements)

Process Area	Ventilation Rate (cfm)	H_2S Concentration (ppmv)
Screens	1,000	25
Equalization	1,000	25
Sludge Holding	1,000	25
System Total	3,000	25

6.3 Overview

A BioRem unit can deliver consistent, reliable odor control. It has become popular for its low operating costs relative to other conventional forms of treatment.

A typical biofilter system includes humidification chamber, blowers, and a media bed. Odorous air is blown through the humidification chamber and enters the biofilter. Humidification chambers typically consist of FRP vessels equipped with sprayers and packed with counter-current flow (water flown down through the media and foul air flowing up through media). Drainage will be provided, and the leachate will be collected and discharged to the plant drain pump station and recycled back through the treatment process.

BioRem odor control unit(s) will be used due to their excellent experience and the least frequent media replacement.

7.0 Plant Drain Pump Station

7.1 Process Description

A small plant drain system will be provided to collect liquid from the unit process by gravity and pump it back to the headworks. The process drains that will flow to the plant drain system include the following:

1. Wastewater is generated throughout the plant including bathrooms, showers, and wash down areas.
2. Filtrate from sludge dewatering process.
3. Wash water.
4. Water used in screening.

The plant drain pump station will be designed for buildout conditions. The station will be precast or fiberglass circular wet well with duplex pumps. Each pump will be able to provide the drainage of the largest structure or treatment unit in less than 8 hours. Therefore, each pump will have a minimum capacity of 10 gpm. The pump will be heavy duty, non-clog, and submersible type for continuous or intermittent pumping of wastewater from the process units back to the headworks. Pumping will be controlled by the water level in the wet well.

Plant Drain Pump Station Design Criteria and Preliminary Equipment Sizing and Selection

Parameter	Design Value
Number of Pumps	2 (1 Duty + 1 standby)
Type	non-clog submersible
Manufacturer	Flygt or Similar
Design Point	10 gpm @ 30 ft. TDH
Wet Well Dimensions	4 ft. diameter (min.)

7.2 Control Strategy

The plant drain pump station will be controlled using ultrasonic level elements. Level float switches for LOW LOW and HIGH HIGH liquid level alarms will also be in the wet well for back-up. During normal operation, the pumps will start and stop automatically as the wet well level varies.

8.0 Location of Treatment and Effluent Disposal Facilities

The Orange Hill Development will include a maintenance and utility area. This area will contain the wastewater treatment plant, golf course irrigation system, 2.5 MG irrigation water ground storage tank and the golf course maintenance facility.
The coordinates of the WWTP are:

- Latitude: 32° 40' 07"
- Longitude: (-) 80° 06' 54"

Treated effluent will be pumped into a 2.5 MG ground storage tank.

9.0 Description of the Blended Water (Treated Effluent Water and Irrigation Water)

Orange Hill Development is committed to an ecological initiative and sustainability standards as demonstrated within the golf course design and project layout. The development shows the commitment to preserve the existing wetlands while integrating the golf course with conservation areas providing natural spaces and buffers. It was determined that a point discharge into local

waters will not be as sustainable as reusing the effluent for irrigation. So, the use of treated effluent water blended with other irrigation waters will be used on the golf course.

Treated effluent from WWTP will be blended with the irrigation water of as described herein. The treated effluent, approximately 40,000 gpd max flow buildout, will blend with the irrigation water, approximately 800,000 gpd (and as low as 500,000 gpd) as stated by the golf course superintendent, giving a dilution ratio of 1:20 (5%) (at low 8%/1:12). The blended water will irrigate the 115-acre Orange Hill Golf Course (including driving range practice areas and a short course). Exhibit F includes calculations on the blended water anticipated characteristics. Exhibit I presents the golf course irrigation water supply concept.

10.0 Layout Of Areas to Be Served

Exhibit C shows the boundary of the area to be served, and a concept plan for the collection system. Exhibit D presents a conceptual layout of the plant. The plant and collection system will not serve areas outside these boundaries.

11.0 Impact Of Discharge on Receiving Waters

Treated effluent from the wastewater plant will not be discharged to a receiving water body. Tertiary treated effluent will be blended with irrigation water and used to irrigate the Orange Hill Golf Course, so there is no impact on the receiving waters.

12.0 Equipment And Service Failure or Shutdown

Maintaining uninterrupted wastewater treatment and proper disposal is paramount. Therefore, the entire treatment plant and related processes will be provided with standby power or emergency generator should the primary power supply fail. An emergency generator will be provided and sized to provide sufficient electrical power to operate the plant and effluent pump station at full capacity. Consideration will be given to providing redundant key operations equipment to provide a backup in case of equipment failure. Examples of components potentially needing redundancy are.

- Pumps
- Screens
- Blowers
- Treatment process equipment

In addition, spares or duplicate components will be kept on-site for needed replacements.

A large effluent holding tank will be incorporated to temporarily hold the treated effluent if the dispersion equipment or rains limit disposal. The effluent holding tank(s) for 7-day storage of effluent which is approximately 280,000 gallons will be in a 2,500,000-gallon ground storage tank. This tank will be used for irrigation water storage. Following disinfection, treated tertiary effluent from the MBR plant will be pumped to the storage tank via an effluent pumping station.

A SCADA (Supervisory Control and Data Acquisition) system will monitor the key equipment and operations. The SCADA system will provide instant notice to the operators regarding the process and emergency or alarm conditions. The system will also allow Kubota, the MBR supplier, to remotely troubleshoot the process if needed for immediate action.

13.0 Alternatives Analysis and Consolidation of Facilities

An alternative analysis of various wastewater treatment and disposal options was previously evaluated for their applicability to the Orange Hill Development project.

The option of a centralized public wastewater treatment plant was excluded because no such service is available around the Project. So, designing and building a new WWTP is the only available solution and has been the accepted plan by regulatory agencies for over 20 years. It was determined a treatment plant would be built using a small area in the northeast corner of the Orange Hill property.

Discharging the treated effluent directly to surface water was ruled out because it is not wisely using the effluent in a beneficial fashion.

14.0 Operation and Maintenance

The development must be private therefore a Homeowners Association (HOA) or Property Owners Association (POA) will maintain the roads, drainage, sanitary sewer collection system, and the wastewater treatment plant.

Since this facility will be maintained by the HOA (POA), the entity will have assurances as follows:

1. Contact information for those responsible for policy decisions, ensuring compliance with State regulatory requirements and daily operations.
2. Description of any contracts for the management or operation of the system and how legal, engineering, and other professional services are provided.
3. Description of the qualifications of the operators and managers of the system including experience in operating other utility systems.
4. Emergency Management Plan in accordance with the SCDHEC requirements including a notification plan containing names and 24-hour phone numbers of responsible persons to contact in the event of an emergency.
5. Proper certification of personnel to operate and maintain the infrastructure. Proper certification will be in accordance with SCDHEC regulations for size and type of plant.
6. A list of maintenance equipment and spare parts to be kept on hand at the new facility.
7. A list of laboratory testing equipment and/for testing firm(s) for compliance monitoring.
8. A copy of the Operation & Maintenance (O&M) Manual for the proposed system.

South Carolina Department of Health and Environmental Control (SCDHEC) requires financial assurances to ensure proper funds are set aside to operate and maintain the plant if needed. Exhibit H is a template for a financial assurance agreement.

15.0 POA Viability

Since this facility will be established as a private entity (by Kiawah Resort Associates, L.P.) ultimately operated by the Property Owners Association (POA), the initial Owner and Developer will initially offer Management, Operation & Maintenance and abide by the tasks listed below. Financial assurances will be in accordance with the draft agreement included in Exhibit H. Kiawah Resort Associates, L.P. (KRALP) has experience owning and operating a utility. KRALP owned and managed the Kiawah Island Utility from June 1988 through July 1, 2014, and managed operations thereafter through an affiliated entity until March 9, 2016. This experience will help direct proper operations and establish the framework for operating.

At some point in time the plant will be transferred to the POA as the Developer's involvement in the property decreases.

15.1 Managerial Capacity – Owner Shall Provide:

1. A description of the organization that clearly defines primary responsibilities of all key personnel involved in management and operation of the wastewater infrastructure and reporting relationships.
2. Contact information for those responsible for policy decisions, ensuring compliance with State regulatory requirements and daily operations.
3. Description of any contracts for the management or operation of the system and how legal, engineering, and other professional services are provided.
4. Identification of ownership.
5. Description of any leases or easements for land, wastewater effluent disposal sites or physical facilities used in the operation of the system.
6. Description of the qualifications of the operators and managers of the system including experience in operating other utility systems.
7. Description of a training plan to keep operators current with the regulatory requirements of managing the system.
8. Emergency Management Plan in accordance with SC DHEC requirements including a notification plan containing names and 24-hour phone numbers or responsible persons to contact in the event of an emergency.
9. Description of service policies including providing customers with information and handling complaints.
10. Disclosure of any encumbrances, trust indentures, bankruptcy decrees, legal orders or proceedings or anything that may affect or limit the control of the system.

15.2 Operation & Maintenance – Owner Shall Provide:

1. Evidence of proper certification of the personnel employed by Owner to operate and maintain the wastewater system. Proper certification shall be in accordance with SC DHEC regulations for size and type of the plant and related.
2. A list of maintenance equipment and spare parts to be kept on hand.
3. A list of laboratory testing equipment and provisions for compliance monitoring as well as evidence of proper certification of personnel if laboratory analysis is to be conducted in-house (if any).
4. Evidence of sufficient staff to adequately operate and maintain the wastewater infrastructure in accordance with SC DHEC regulations must be provided.
5. A log of training for each operator/staff.
6. Disclosure of any monitoring violations incurred.
7. A copy of the Operation & Maintenance (O&M) Manual for the wastewater system.

THOMAS & HUTTON

PRELIMINARY ENGINEERING REPORT FOR:

ORANGE HILL DEVELOPMENT RECLAIMED WATER FACILITY (RWF) AND WASTEWATER COLLECTION SYSTEM CHARLESTON COUNTY, SOUTH CAROLINA

EXHIBITS

J – 25152.0100

JUNE 2023

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EXHIBIT A
AERIAL LOCATION MAP

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LOCATION MAP

PROJECT:

ORANGE HILL DEVELOPMENT

CLIENT:

KIAWAH RESORT ASSOCIATES, L.P.

LOCATION: CHARLESTON COUNTY, SOUTH CAROLINA

DATE: MAY 2023 | DRAWN BY: CGB | SHEET: 1 OF 1

JOB NUMBER: 25152.0100 | REVIEWED BY: MFY | SCALE: 1" = 2000'

THOMAS & HUTTON
Engineering | Surveying | Planning | GIS | Consulting

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Mt. Pleasant, SC 29464 • 843.849.0200

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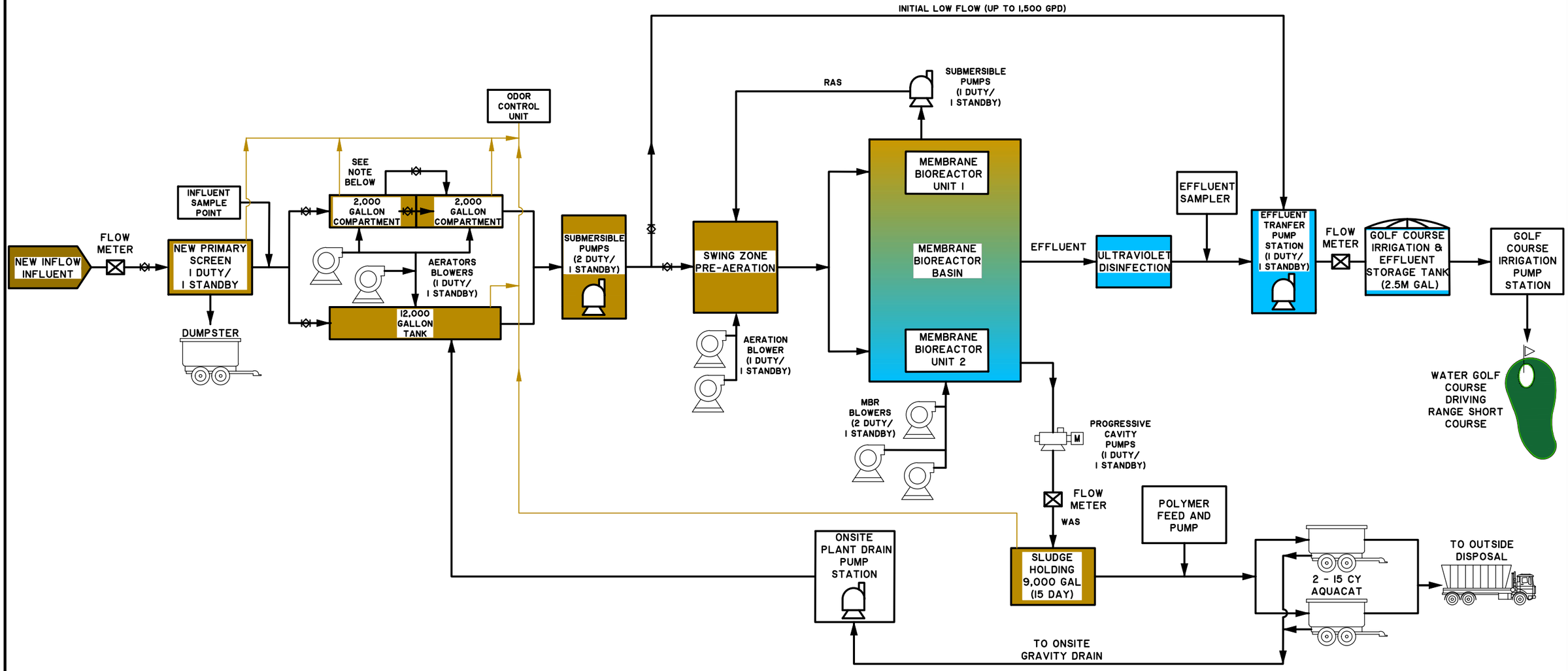
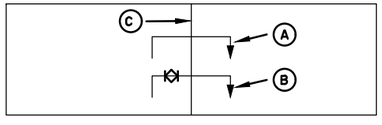
EXHIBIT B
PROCESS FLOW DIAGRAM



OVERALL PROCESS FLOW DIAGRAM

NOTES:

A. INITIAL PHASE PIPE TO SEPARATE COMPARTMENTS UNTIL 1,500 GPD FLOW.
B. CLOSE A AND OPEN B TO FUNCTION AFTER 1,500 GPD FLOW.
C. 4,000 GALLONS FULL BAFFLE WELL TO CREATE TWO (2) CHAMBERS FOR TREATMENT UP TO 1,500 GPD. THEN OPEN TO FUNCTION AS ONE 4,000 GALLON STRUCTURE.



ORANGE HILL DEVELOPMENT

JOHN'S ISLAND, SOUTH CAROLINA

PROCESS FLOW DIAGRAM - RECLAIMED WATER FACILITY

CLIENT:

KIAWAH RESORT ASSOCIATES, L.P.

LOCATION: CHARLESTON COUNTY

DATE: MAY 2023 DRAWN BY: CGB SHEET: EXHIBIT B

JOB NUMBER: J-25152.0100 REVIEWED BY: MFY SCALE: NTS

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EXHIBIT C
MASTER PLAN COLLECTION SYSTEM

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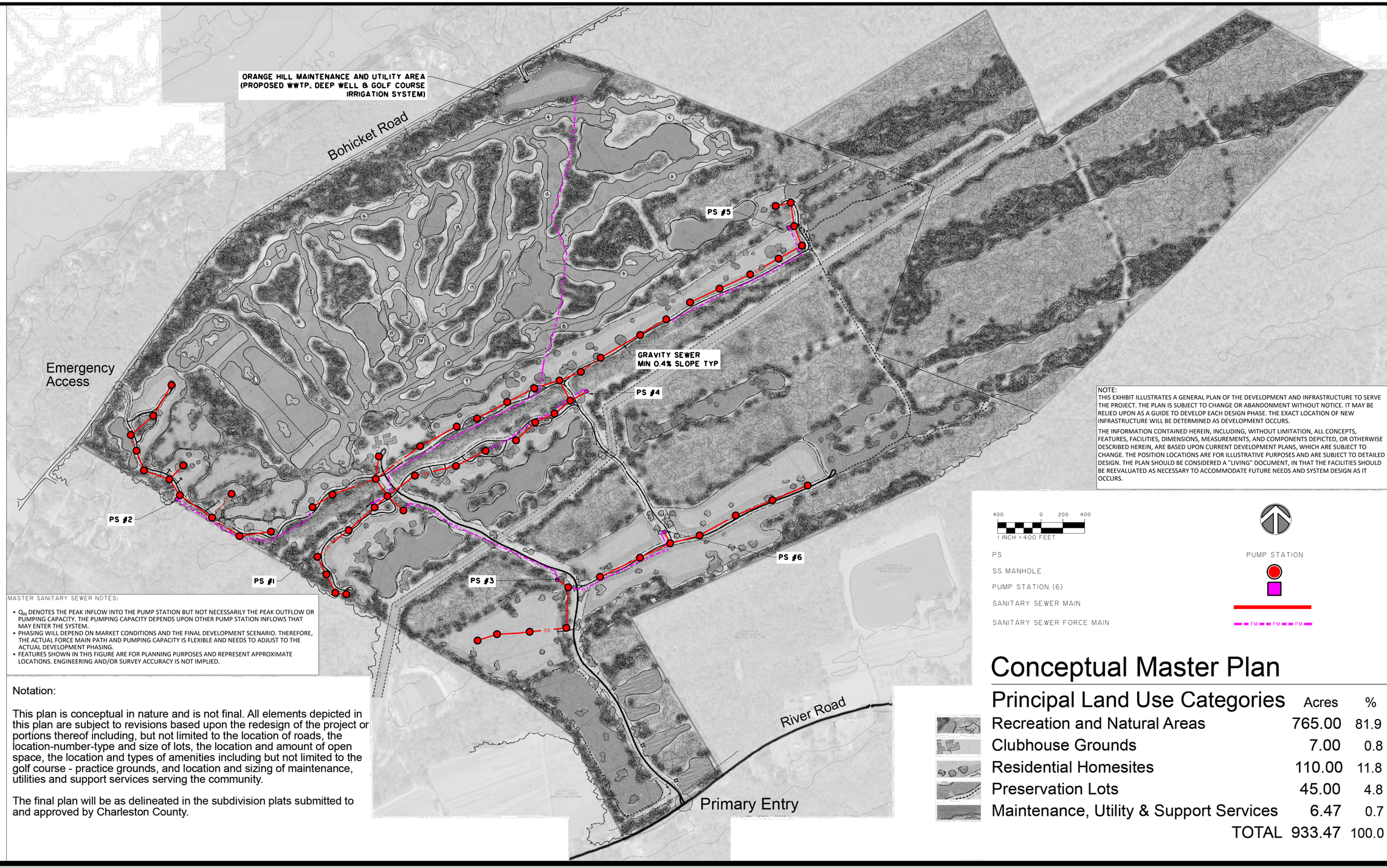

NOTE:
THIS EXHIBIT ILLUSTRATES A GENERAL PLAN OF THE DEVELOPMENT AND INFRASTRUCTURE TO SERVE THE PROJECT. THE PLAN IS SUBJECT TO CHANGE OR ABANDONMENT WITHOUT NOTICE. IT MAY BE RELIED UPON AS A GUIDE TO DEVELOP EACH DESIGN PHASE. THE EXACT LOCATION OF NEW INFRASTRUCTURE WILL BE DETERMINED AS DEVELOPMENT OCCURS.

THE INFORMATION CONTAINED HEREIN, INCLUDING, WITHOUT LIMITATION, ALL CONCEPTS, FEATURES, FACILITIES, DIMENSIONS, MEASUREMENTS, AND COMPONENTS DEPICTED, OR OTHERWISE DESCRIBED HEREIN, ARE BASED UPON CURRENT DEVELOPMENT PLANS, WHICH ARE SUBJECT TO CHANGE. THE POSITION LOCATIONS ARE FOR ILLUSTRATIVE PURPOSES AND ARE SUBJECT TO DETAILED DESIGN. THE PLAN SHOULD BE CONSIDERED A "LIVING" DOCUMENT, IN THAT THE FACILITIES SHOULD BE REEVALUATED AS NECESSARY TO ACCOMMODATE FUTURE NEEDS AND SYSTEM DESIGN AS IT OCCURS.

400 0 200 400
1 INCH = 400 FEET

PS
SS MANHOLE
PUMP STATION (6)
SANITARY SEWER MAIN
SANITARY SEWER FORCE MAIN

PUMP STATION

FM FM FM

MASTER SANITARY SEWER NOTES:

- Q_{IN} DENOTES THE PEAK INFLOW INTO THE PUMP STATION BUT NOT NECESSARILY THE PEAK OUTFLOW OR PUMPING CAPACITY. THE PUMPING CAPACITY DEPENDS UPON OTHER PUMP STATION INFLOWS THAT MAY ENTER THE SYSTEM.
- PHASING WILL DEPEND ON MARKET CONDITIONS AND THE FINAL DEVELOPMENT SCENARIO. THEREFORE, THE ACTUAL FORCE MAIN PATH AND PUMPING CAPACITY IS FLEXIBLE AND NEEDS TO ADJUST TO THE ACTUAL DEVELOPMENT PHASING.
- FEATURES SHOWN IN THIS FIGURE ARE FOR PLANNING PURPOSES AND REPRESENT APPROXIMATE LOCATIONS. ENGINEERING AND/OR SURVEY ACCURACY IS NOT IMPLIED.

Notation:

This plan is conceptual in nature and is not final. All elements depicted in this plan are subject to revisions based upon the redesign of the project or portions thereof including, but not limited to the location of roads, the location-number-type and size of lots, the location and amount of open space, the location and types of amenities including but not limited to the golf course - practice grounds, and location and sizing of maintenance, utilities and support services serving the community.

The final plan will be as delineated in the subdivision plats submitted to and approved by Charleston County.

Conceptual Master Plan

Principal Land Use Categories	Acres	%
Recreation and Natural Areas	765.00	81.9
Clubhouse Grounds	7.00	0.8
Residential Homesites	110.00	11.8
Preservation Lots	45.00	4.8
Maintenance, Utility & Support Services	6.47	0.7
TOTAL	933.47	100.0

PREPARED FOR:
KIAWAH RESORT ASSOCIATES, LP

CONCEPTUAL MASTER SANITARY SEWER PLAN
ORANGE HILL DEVELOPMENT
JOHNS ISLAND, CHARLESTON COUNTY, SC
MAY 2023

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EXHIBIT D
CONCEPTUAL LAYOUT RWF

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MENT SHED BUILDING

WASH AREA

FUEL

ELECTRICAL BUILDING

15'

9.82'

25'

3'

6.9'

8.19'

GENERATOR

6'

OFFICE
BATH
STORAGE

5'

19.28'

10'

PH 1 AQUACAT

PH 2 AQUACAT

SLUDGE DEWATER HOPPER

PLANT DRAIN PS

12'

ODOR

24'

SHT
12' DIA x 11' H
9,000 GAL

AWNING FOR SHT EQUIPMENT

UV BUILDING

34.67'

24'

6.42'

8.4'

SCREEN HOPPER

SCREEN

20'

EQ 4,000 GAL

EQ (12,000 GAL)

KUBOTA MBR
12' x 44'

20'

34.7'

50'

EFFLUENT TRANSFER PS

IRRIGATION WITHDRAWAL PS

15'

10'

BAYS

N

E

W

S

ORANGE HILL DEVELOPMENT

JOHN'S ISLAND, SOUTH CAROLINA

PRELIMINARY RWP (RECLAIMED WATER PLANT) LAYOUT

CLIENT:

KIAWAH RESORT ASSOCIATES, L.P.

LOCATION: CHARLESTON COUNTY

DATE: JUNE 23, 2023 DRAWN BY: CGB SHEET:

JOB NUMBER: J-25152.0100 REVIEWED BY: MFY SCALE: 1" = 20'

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EXHIBIT E
OAKRIDGE LETTER

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Waste Management

Industrial Technical

Service Center

36964 Alabama Highway 17
P.O. Box 55
Emelle, AL 35459
(800) 963-4776

Ray Pantlik, P.E., Kiawah Resort Associates, LP,
One Kiawah Island Parkway,
Kiawah Island, SC 29455
843-814-3418
rpantlik@southstreetpartners.com,

Ray,

This letter is sent to you regarding the disposal of the dried or dewatered sludge to be generated at the proposed Orange Hill WWTP, 3345 Bohicket Rd., Johns Island, SC 29455. Waste Management agrees to dispose of the waste provided test results and facility operating conditions allow.

The waste disposal facility is

Oakridge Landfill
2183 Highway 78, P.O. Box 145
Dorchester, SC 29437
Phone (843) 563-2607
Jason Bazemore, District Manager

Test results will be needed to show the waste is non-hazardous/non-regulated. To provide undisturbed disposal, an unconfined strength test showing the tensile strength of 750 PSF using test method ASTM D2611 is requested. This will allow WM to eliminate the soft/wet waste criteria. The landfill is aware of this by my communication of this letter to them.

I hope this provides the information needed. Thank you for your business with Waste Management.

Sincerely,

Danny Patrick

Danny Patrick
Waste Approval Manager
WM South Atlantic Region

THOMAS & HUTTON

EXHIBIT F
BLENDING SNAPSHOT

thomasandhutton.com

Orange Hill Development
Irrigation Well
T&H Project No. 25152.01000
Wastewater Dilution Calculations
May 2, 2023

INITIAL WWTP FLOW = 1,500 GPD (0.0015 MGD)

SEPTIC TANK/PRIMARY TREATMENT

USEPA Onsite Wastewater Treatment Systems Manual
Table 4-12. Average septic tank effluent concentrations of selected parameters from variuos commercial establishments

	BOD, mg/L	TSS, mg/L
Country Club A	197	56
Country Club B	333	121
Country Club C	101	44
Average	**210**	**74**

$$C_1V_1 + C_2V_2 = C_3(V_1 + V_2)$$

Input Cells Calculated Cells

BOD Dilution

Note: BOD sampling data is not available for Charleston Water System. Assume CWS purchased water has 2 mg/L maximum BOD concentration.

C1	*210*	*mg/L*	*Septic Tank Effluent BOD*
V1	*0.0015*	*MGD*	*Septic Tank Effluent Flow*
C2	*2*	*mg/L*	*Purchased Water BOD*
V2	*0.5*	*MGD*	*Purchased Water Flow*
C3	*2.6*	*mg/L*	*Calculated Concentration*

TSS Dilution

Note: TSS sampling data is not available for Charleston Water System. Turbidity is a surrogate measure for TSS.

A log-linear model shows strong positive correlation between TSS and turbidity (R2=0.9374) with a regression equation of [ln (TSS)=0.979 ln (Turb.) +0.574].

95% of Turbidity samples must be less than 0.3 NTU. Assume CWS purchased water has 0.3 NTU maximum Turbidity.

0.3 NTU Converts to approx. 0.55 mg/L

C1	*74*	*mg/L*	*Septic Tank Effluent TSS*
V1	*0.0015*	*MGD*	*Septic Tank Effluent Flow*
C2	*0.55*	*mg/L*	*Purchased Water TSS*
V2	*0.5*	*MGD*	*Purchased Water Flow*
C3	*0.8*	*mg/L*	*Calculated Concentration*

Orange Hill Development
Irrigation Well
T&H Project No. 25152.01000
Wastewater Dilution Calculations
May 2, 2023

BUILDOUT WWTP FLOW = 40,000 GPD (0.04 MGD)
MBR WWTP/TERTIARY TREATMENT

Table 2: SCDHEC Effluent Standards

Parameter	Secondary Treatment Standards (Monthly Ave.)	Reclaimed Water System Standards (Monthly Ave.)
BOD_5	≤ 30 mg/L	≤5 mg/L
TSS	≤ 30 mg/L	≤5 mg/L

$$C_1V_1 + C_2V_2 = C_3(V_1 + V_2)$$

Input Cells Calculated Cells

BOD Dilution

Note: BOD sampling data is not available for Charleston Water System. Assume CWS purchased water has 2 mg/L maximum BOD concentration.

C1	*5*	*mg/L*	*MBR WWTP Effluent BOD*
V1	*0.04*	*MGD*	*MBR WWTP Effluent Flow*
C2	*2*	*mg/L*	*Purchased Water BOD*
V2	*0.5*	*MGD*	*Purchased Water Flow*
C3	*2.2*	*mg/L*	*Calculated Concentration*

TSS Dilution

Note: TSS sampling data is not available for Charleston Water System. Turbidity is a surrogate measure for TSS.

A log-linear model shows strong positive correlation between TSS and turbidity (R2=0.9374) with a regression equation of [ln (TSS)=0.979 ln (Turb.) +0.574].

95% of Turbidity samples must be less than 0.3 NTU. Assume CWS purchased water has 0.3 NTU maximum Turbidity.

0.3 NTU Converts to approx. 0.55 mg/L

C1	*5*	*mg/L*	*MBR WWTP Effluent TSS*
V1	*0.04*	*MGD*	*MBR WWTP Effluent Flow*
C2	*0.55*	*mg/L*	*Purchased Water TSS*
V2	*0.5*	*MGD*	*Purchased Water Flow*
C3	*0.9*	*mg/L*	*Calculated Concentration*

THOMAS & HUTTON

EXHIBIT G
EXCERPT 2004 PUD

thomasandhutton.com

ORANGE HILL PLANTATION

PLANNED UNIT DEVELOPMENT APPLICATION

JANUARY 2002
(Rev. November 2004)

accessory uses may be subject to Charleston County site review process prior to construction.

5. Utility Areas

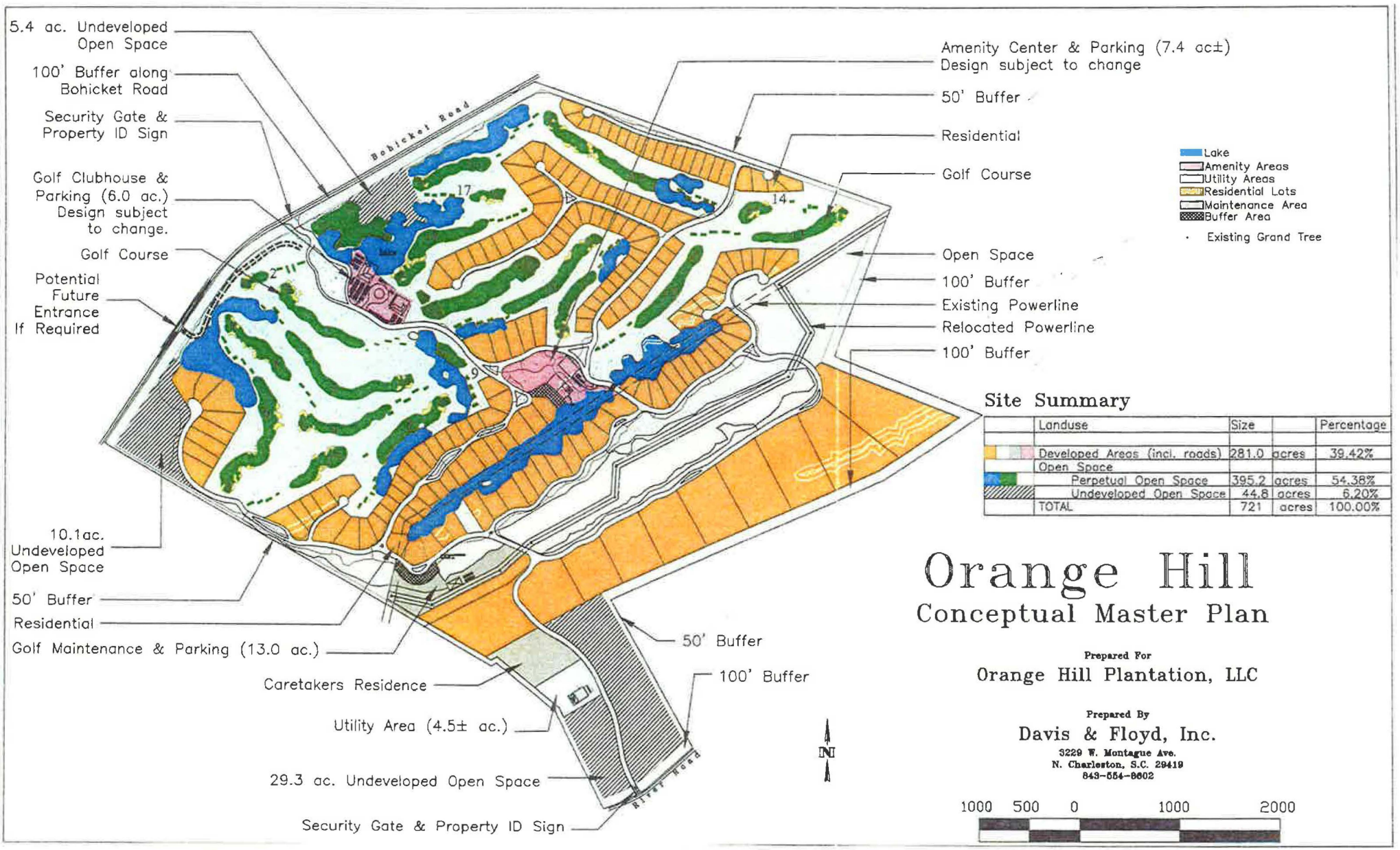
Uses allocated within the Utility Areas include, but are not limited to, storage area for residents to park boats, trailers and any other large vehicles that are not allowed to remain at their homesite. To properly serve only Orange Hill's wastewater needs a small "package" plant or lagoon will be built within the Utility Areas. The proposed site is located well away from homesites in a heavily wooded area indicated on the Master Plan. The effluent will be piped and utilized for irrigation of the golf course. The plant should be fully operational when development begins. Any structures requiring septic service prior to the plant coming online will be handled on a case-by-case basis and served by temporary facilities as approved by SCDHEC and the County. Sewage pumping stations will be necessary for the collection of wastewater and will be located on the preliminary subdivision plan. It is anticipated that potable water will be provided by St. Johns Water Company and/or a reverse osmosis plant with ground storage tanks and pumping equipment that could be located in the Utility Area. Utility Areas will have a 50' buffer surrounding them that will consist of native and relocated vegetation and trees.

6. Amenity Center

The Amenity Center location is designated on the Master Plan. While the area so designated is approximately 7.5 acres, only 3 acres are planned to be built upon, with the balance being open space. The Amenity Center may include facilities such as a swimming pool, tennis courts, dock, a building housing toilets and a workout facility. The swimming pool area will be fenced in accordance with County standards and guidelines. The tennis courts will have fencing designed to facilitate play that will not exceed 12' in height. The tennis courts are not currently scheduled to be lighted but may be lighted in the future. Lighting, if added, will meet Charleston County regulations and will require Site Plan approval prior to construction.

Project Land Use Calculations (see Master Plan for details)

Developed Area, incl. residential, roadways, clubhouse, maintenance area, amenity center, septic plant, etc.	281 acres	39%
Open Space, incl. Perpetual & Designated Open Space	440 acres	61%



Site Summary

	Landuse	Size		Percentage
	Developed Areas (incl. roads)	281.0	acres	39.42%
	Open Space			
	Perpetual Open Space	395.2	acres	54.38%
	Undeveloped Open Space	44.8	acres	6.20%
	TOTAL	721	acres	100.00%

Orange Hill

Conceptual Master Plan

Prepared For

Orange Hill Plantation, LLC

Prepared By

Davis & Floyd, Inc.
3229 W. Montague Ave.
N. Charleston, S.C. 29419
843-554-8602

1000 500 0 1000 2000

THOMAS & HUTTON

EXHIBIT H
FINANCIAL ASSURANCE AGREEMENT TEMPLATE

thomasandhutton.com

SOUTH CAROLINA

DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

KIAWAH RESORT ASSOCIATES, LP

FINANCIAL ASSURANCE AGREEMENT

FOR

ORANGE HILL WASTEWATER TREATMENT FACILITIES

JOHNS ISLAND, SC

This Agreement ("Agreement" or "Contract") by and between Kiawah Resort Associates, LP, a Delaware limited partnership ("Owner") and the South Carolina Department of Health and Environmental Control ("DHEC" or the "Department") is made and entered into this _____ day of _____, 2023, to establish financial assurances for the operations and maintenance of the Orange Hill Wastewater Treatment Facilities and spray irrigation system.

A. FACTUAL BACKGROUND

1. Owner owns contiguous parcels of approximately 930 undeveloped acres (the "Project") on Johns Island in Charleston County located between Bohicket and River Roads where Owner is in the process of planning, permitting, and developing a golf course, other recreational amenities, no more than 120 single family dwelling units, and related infrastructure. Owner desires to establish a wastewater system to provide wastewater service ("OWS") for the all the uses within the Project including the residential lots to be created.

2. The Owner will establish a master property owners' association (the "Association"). All property owners within the Project will be members of the Association and will be bound under the Declaration of Covenants, Conditions, and Restrictions (the "Master Declaration"), to pay assessments. The Owner intends to transfer the OWS and all related permits to the Association (subject to DHEC approval). The Association will be authorized under the Master Declaration to own and operate the OWS and include its costs in the assessments of the members

of the Association.

3. On or about _____, 2023, Thomas & Hutton submitted a preliminary engineering report (PER) to DHEC for the Orange Hill OWS.

4. On or about _____, 2023. the Department received an ND Permit Application from Thomas & Hutton on behalf of Owner.

5. On or about _____ 2023, Thomas & Hutton submitted a design report for the first phase of the OWS to the DHEC.

6. On or about _____, 2023, Owner submitted a construction permit application to DHEC for the OWS.

7. On or about _____, 2023, the Berkeley-Charleston-Dorchester Council of Governments (BCDCOG") issued a 208 Plan conformance certification (Attachment A).

8. In accordance with S.C. Regulation 61-9.600, entities owning wastewater treatment systems must demonstrate technical. managerial, and financial viability to reasonably assure compliance with DHEC laws and regulations as a prerequisite for receiving a wastewater discharge permit.

9. Owner will contract with a licensed wastewater operator ("Operator") to provide routine operation, inspection, and maintenance of the OWS as required in the construction permit and to fulfill the requirement to provide financial assurances.

10. ln light of the above events, and in reference to the requirements of Regulation 61-9.600, DHEC has determined that this Agreement is necessary and appropriate and both parties agree to the following terms and conditions.

B. AUTHORITY

1. The provisions of R.61-9.505.8(c) require financial assurance by the Owner for the purpose of ensuring the operation and maintenance of the permitted system set forth above.

C. RESPONSIBILITIES

1. DHEC shall:

a) Establish an identified interest-bearing account ("Account") in the South Carolina Office of the State Treasurer. Interest will be determined by the State Treasurer's Office.

b) Provide monthly Account status information including e-mailing the current balance information to the Owner.

2. Owner, and its successors and assigns, shall:

a) At build out, limit peak sewer flow from the members of the Association to no more than 40,000gallons per day ("gpd").

b) Construct the OWS in accordance with the plans provided in the construction permit application and any conditions set forth in the OWS Permit.

c) Provide for satisfactory operation, inspection, monitoring, maintenance, and repair or replacement of the OWS such that the viability of the OWS is not compromised for the life of the system.

d) Enter into an agreement with a Biological Wastewater Operator (Operator) of the appropriate grade certified by the Environmental Certification Board of the South Carolina Department of Labor, Licensing, and Regulation to operate the wastewater treatment plant and to provide inspections, maintenance, and repairs of the OWS covered by this Agreement. The Operator shall be entitled to reasonable compensation from OWS for its services including reporting the condition of the OWS to the Owner and DHEC.

e) If Operator terminates its service agreement with Owner as the servicing entity, Owner has the responsibility to procure a new licensed service provider within sixty (60) days from the date of such termination with such new service provider to be approved by DHEC.

f) Maintain a minimum Account balance of $ _____ at all times for the ongoing operation, maintenance, and repair or the onsite sewage system necessary to serve the maximum sewer flows referenced above.. The initial deposit of $_____ shall be required prior to DHEC's issuance of a permit to operate the OWS. In order to maintain the balance of $_____ in the Account, any amount expended

therefrom shall be replaced by Owner. DHEC will submit this money to the Account maintained by the State Treasurer's Office for the costs associated with restoration and maintenance of the OWS in accordance with this Agreement.

g) Submit to DHEC within sixty (60) days of the execution of this Agreement the financial assurance amount referenced above.

h) Funds in the Account shall be used only upon the authorization of DHEC to perform necessary operation and maintenance of the OWS.

i) In the event that funds from the Account must be used, the Owner shall refund/replenish the Account within six (6) months. A refund shall be accomplished by submitting payment to DHEC, and DHEC will then submit this money to the Account maintained by the State Treasurer's Office.

j) Comply with all regulations, notifications, and approvals required by applicable state law.

k) Owner shall notify DHEC at the time Owner desires to sell or otherwise transfer or convey the property, the collection system, the OWS and/or the property upon which the OWS is located to the Association. This Agreement must be modified to recognize the Association and the obligations of each Party. Owner recognizes and agrees that DHEC may require this Agreement to remain in place unless and until the Association provides sufficient financial assurance to DHEC for the continued operation and maintenance of the OWS. No less than thirty (30) days prior to the transfer, Owner must send notice of the proposed transfer of the OWS to:

Domestic Wastewater Permitting Section
Water Facilities Permitting Division of the Bureau of Water
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

l) The notification shall include Owner’s certification of compliance with this Agreement, and that the OWS is in compliance with state and federal statutory and regulatory requirements.

m) If, during the term of this Agreement, any event arises that would inhibit or prohibit Owner from

complying with the duties, obligations, or responsibilities imposed by this Agreement, Owner will give immediate notice to DHEC at the address listed above.

D. TIME OF PERFORMANCE

1. This Contract shall be effective on the date set forth below by the DHEC Contracts Manager and will terminate _____ years after the effective date. This Agreement shall terminate if Owner transfers the Property, permits, or transfers the OWS to the Association or another entity provided that the new owner enters into a new Financial Assurance Agreement satisfactory to DHEC.
2. Prior to the termination date of this Contract, Owner and DHEC may evaluate extending the Contract to establish a new termination date. Should both parties agree to extend this Contract, the extension shall be granted for a period up to, but not longer than five (5) years.

E. TERMS AND CONDITIONS

1. The appropriate amount of Financial Assurance required for these permitted facilities is $_____.
2. The failure by Owner to maintain or operate all OWS or to maintain funds in the Account as described in the Terms and Conditions of this Agreement may result in legal action, penalties and/or the revocation of DHEC's approval to operate Owner's OWS.
3. Nothing in this Agreement shall be construed to limit DHEC's authority to issue orders, impose fines, or take other action it deems necessary to protect the environment, public health, and safety, or to compel compliance with the laws of this state. Owner's failure to comply with this Agreement shall subject them to all applicable enforcement actions in accordance with DHEC's statutory and regulatory authority.
4. The release and return of these funds to Owner with interest earned is conditional upon one of the following:

a) The permitted OWS being fully and properly connected to either (1) a public wastewater system or (2) a PSC-regulated utility company using other funding mechanisms after approval by DHEC; or

b) Transfer of the OWS to the Association or an entity that does not include the Owner, or their affiliates or assignees, with notification to DHEC of the proposed transfer of the OWS permit (or issuance of a new permit) to prospective Owner in compliance with R.61-56, and subsequent to the new permittee establishing Financial Assurance as required by DHEC.

5. Owner's obligation to pay for operation and maintenance is not limited in any way by the provision of the Financial Assurance. The intent of providing Financial Assurance is to reserve a reasonable duration of operational and maintenance costs. The Owner remains responsible for complying with all state and federal statutes and regulations applicable to the ownership, operation, maintenance, and repair or replacement of the permitted systems.
6. DHEC may utilize the funds in the Account maintained by the State Treasurer's Office in the event Owner:

a) is unable, or refuses to perform the required operation or maintenance in a timely fashion; or

b) is unable, or refuses, to contract with a qualified Operator for routine inspection and monitoring.

Upon thirty (30) days written notice, DHEC may hire a qualified Operator to perform necessary operation or maintenance of the OWS. The costs for the services listed in subsections a. and b.

above shall be paid from the Account maintained by the State Treasurer's Office upon DHEC's approval of the invoices submitted by the Operator.

7. All notices, deliveries, payments, or other communications required or permitted hereunder shall be deemed given when sent by certified or registered mail addressed as follows:

   To DHEC:

   Domestic Wastewater Permitting Section
   Water Facilities Permitting Division of the Bureau of Water
   South Carolina Department of Health and Environmental Control
   2600 Bull Street; Columbia, SC 29201

   To Owner:

   Kiawah Resort Associates, LP

   Physical Address:
   253 Gardeners Circle, Suite 250
   Kiawah Island, SC 29455

   Mailing Address:
   130 Gardeners Circle, Suite 123
   Kiawah Island, SC 29455

   Attention: Jordan Phillips and Chris Randolph

8. If the Owner's address changes, the Owner shall notify DHEC in writing by a letter sent by certified or registered mail to the address listed above within fifteen (15) days of the change.

F. TERMINATION

1. This Contract may be terminated or will expire in accord with the provisions stated above.
2. Funds for performance of services under this Contract may be payable in part from State and/or federal and/or other appropriations. If funds are not appropriated or otherwise available to pay the charges under this Contract, it shall terminate without any further obligation by DHEC upon

providing written notice to Owner.

3. DHEC may terminate this Contract for cause, default or negligence on the part of Owner at any time without thirty days advance written notice. DHEC may, at its option, allow Owner a reasonable time to cure the default before termination.

G. INSURANCE

1. DHEC maintains liability insurance issued through the South Carolina Insurance Reserve Fund as provided by the South Carolina Tort Claims Act. DHEC does not insure the Property or equipment thereon.

H. LIABILITY, NO AGENCY RELATIONSHIP

1. Neither party shall be liable for any claims, demands, expenses, liabilities, and losses (including reasonable attorney's fees) which may arise out of any acts or failures to act by the other party, its employee or agents, in connection with the performance of services pursuant to this Contract. Neither party is an employee, agent, partner, or joint venturer of the other. Neither party has the right or authority to control or direct the activities of the other or the right or ability to bind the other to any agreement with a third party or to incur any obligation or liability on behalf of the other party, unless expressly authorized in this Contract.

I. NON-INDEMNIFICATION; LIMITATION ON TORT LIABILITY

1. Any term or condition of this Contract or any related agreements is void to the extent it: (1) requires DHEC to indemnify, hold harmless, defend, or pay attorney's fees to anyone for any reason; or (2) would have the purpose or effect of increasing or expanding any liability of the State of its agencies or employees for any act, error, or omission subject to the South Carolina Tort Claims Act, whether characterized as tort, contract, equitable indemnification, or any other theory or claim.

J. CHOICE OF LAW

1. The Contract, any dispute, claim, or controversy relating to the Contract and all the rights and obligations of the parties shall, in all respects, be interpreted, construed, enforced, and governed by and under the laws of the State of South Carolina, except its choice of law rules.

K. DISPUTES

1. All disputes, claims, or controversies relating to the Contract shall be brought exclusively in the South Carolina Court of Common Pleas for Richland County or in the United States District Court for the District of South Carolina, Columbia Division. By signing this Contract, the Owner consents to jurisdiction in the South Carolina courts. Owner agrees that any act by DHEC regarding the Contract is not a waiver of either sovereign immunity or immunity under the Eleventh Amendment of the United States Constitution and is not a consent to the jurisdiction of any court or agency of any other state.

L. SERVICE OF PROCESS

1. Owner consents to service of process by certified mail (return receipt requested) to the address provided as the Owner's Notice Address herein, or by personal service or by any other manner that is permitted by law, in or outside South Carolina. Notice by certified mail is deemed effective when received.

M. PLACE OF CONTRACTING

1. This Contract is deemed to be negotiated, made, and performed in the State of South Carolina.

N. CONFIDENTIALITY

1. The parties shall maintain securely any confidential information obtained through the performance of this Contract to ensure the confidentiality of this information in compliance with applicable law. The parties shall use and disclose such confidential information only as required

to perform services under this Contract and as required by applicable law. Confidential information includes information known or maintained in any form, whether recorded or not, consisting of protected health information, other health information, personal information, personal identifying information, confidential business information, and any other information required by law to be treated as confidential, designated as confidential by DHEC, or known or believed by Owner or Owner's employee or agent to be claimed as confidential or entitled to confidential treatment.

O. REGULATIONS

1. The provisions of this Contract are subject to revision of applicable and relevant State or federal statutes and regulations.

P. AMENDMENTS

1. The Contract may only be amended by written agreement of all parties, which must be executed in the same manner as the Contract.

Q. ASSIGNMENT

1. Owner cannot assign or transfer the Contract or any of its provisions without DHEC's written consent, which shall not be unreasonably withheld. Any attempted assignment or transfer not in compliance with this provision is null and void. A change in ownership of Owner is considered

an assignment.

R. INSOLVENCY, BANKRUPTCY, AND DISSOLUTION

1. Notice. Owner shall notify DHEC in writing within five (5) business days of the initiation of insolvency, receivership, or bankruptcy proceedings, whether voluntary or involuntary, and not less than thirty (30) business days before dissolution or termination of business. Notification shall include, as applicable, the date the petition was filed, anticipated date of dissolution or closure of business, identity of the DHEC, the court in which the petition was filed, a copy of the petition, and a listing of all State contracts against which final payment has not been made. This obligation remains in effect until completion of performance and final payment under this Contract.
2. Termination. This Contract is voidable and subject to immediate termination by DHEC upon Owner's insolvency, appointment of a receiver, filing of bankruptcy proceedings, making an assignment for the benefit of creditors, dissolution (if an organization), death (if an individual), or ceasing to do business.

(Signature page(s) to follow)

SOUTH CAROLINA DEPARTMENT OF
HEALTH AND ENVIRONMENTAL CONTROL

BY: _____
Brenda Green, Manager
Domestic Wastewater Permitting Section

DATE: _____

MAILING ADDRESS:

Attn: Domestic Wastewater Permitting Section
SCDHEC
2600 Bull Street
Columbia, SC 29201
803-898-4300

KIAWAH RESORT ASSOCIATES, LP

BY: _____
_____
_____

DATE: _____

MAILING ADDRESS:
Attn: _____

_____
_____
_____

Telephone:
Fax:
E-mail:

TAX/EMPLOYER ID#:

TYPE OF ENTITY (check one):

- ☐ Corporation
- ☐ LLC
- Ξ Partnership
- ☐ Nonprofit organization
- ☐ Government agency or political subdivision
- ☐ Other Governmental body (specify)
- ☐ Individual/sole proprietor
- ☐ Other (specify) _____

If a corporation, LLC, or nonprofit organization:
State of incorporation/organization:
_____

Registered agent and address in South Carolina:
_____
_____
_____

SCDLLR or other license #
_____

THIS AGREEMENT IS NOT OFFICIAL AND BINDING UNTIL SIGNED BY THE DHEC CONTRACTS MANAGER.

BY: _____
Francine Miller
DHEC Contracts Manager

DATE: _____

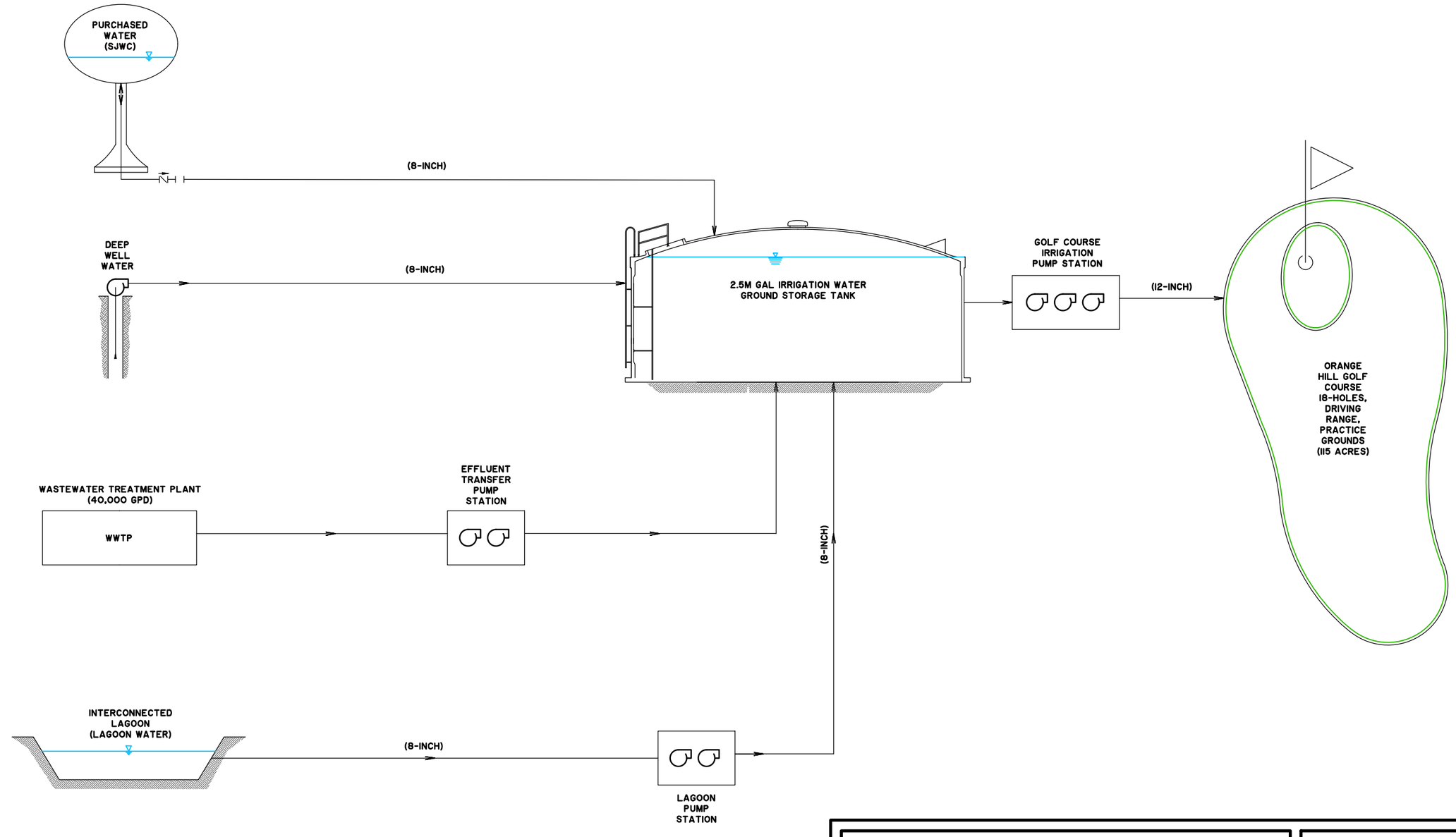
ATTACHMENT A

BCDCOG 208 Plan Approval

THOMAS & HUTTON

EXHIBIT I
GOLF COURSE IRRIGATION WATER SUPPLY DIAGRAM

thomasandhutton.com



NOTES:

1. **BASE LINE WITH PURCHASED WATER**

GOLF COURSE IRRIGATION WATER SUPPLY DIAGRAM

ORANGE HILL

CLIENT:

KIAWAH RESORT ASSOCIATES, LP

LOCATION: JOHNS ISLAND, CHARLESTON COUNTY, SC
DATE: MAY 18, 2023 DRAWN BY: CGB SHEET: VERSION 3
JOB NUMBER: J-25152.0100 REVIEWED BY: MFY SCALE: NTS

THOMAS & HUTTON
682 Johnnie Dodds Blvd. • Suite 100
Mt. Pleasant, SC 29464 • 843.849.0200
www.thomasandhutton.com

THOMAS & HUTTON

EXHIBIT J
SLUDGE HOLDING TANK SIZING

thomasandhutton.com

Sludge Holding Tank Sizing

Design flow	40,000	GPD	
BOD (design)	250	mg/L	
Sludge yield	0.7	WAS/lb of BOD	*Assume*
WAS per day	37,850,000	mg/day	*WAS (Waste Activated Sludge)*
WAS per day	83.27	lb/day	
WAS assume sludge yield	58.29	lb/day	
sludge retention	15	day	
Design MLSS at MBR	12,000	mg/L	*This is provided by the vendor of system (MBR)*
Liters of WAS sludge	2203.2871	day	
Gallons of WAS sludge	581.6678	day	
Roundup	600	gallons per day	
So if the sludge retention is	15	days	
at	600	gallons per day	
then you will need	9,000	gallon tank	
or	1,203	CF	

MUST ENTER VALUE - RED

Conversion Gallons to Liters	3.785
Conversion Liters to Gallons	0.264
Conversion milligrams to lb	0.0000022
Conversion lb to milligrams	453592.37
Conversion Gallons to CF	0.1337
Conversion CF to Gallons	7.4814

THOMAS & HUTTON

EXHIBIT K
LETTER OF COORDINATION FROM BCDCOG

thomasandhutton.com

May 24, 2023

Mr. Ray Pantlik, P.E., Vice President of Development
South Street Partners
1 Kiawah Island Parkway
Kiawah Island, SC 29455

Subject: Proposed Orange Hill WWTF – Johns Island
Charleston County, South Carolina

Mr. Pantlik,

The Berkeley-Charleston-Dorchester Council of Governments (BCDCOG) has been notified of South Street Partners' interest in constructing a non-discharge wastewater treatment facility as part of a planned golf course community that is to be located in Johns Island. As was discussed during a meeting with South Street Partners, Thomas & Hutton and staff of the BCDCOG held on May 15, 2023, existing and proposed wastewater treatment facilities that are located in Berkeley, Charleston and Dorchester counties fall within the jurisdiction of the COG's 208 Water Quality Management Plan. The construction of the proposed treatment facility will require a major amendment to the Water Quality Management Plan. The general process for a major amendment is outlined below. Please note, this process is to be completed prior to requesting SC DHEC's review/approval of the proposed treatment facilities.

1. Preliminary Engineering Report (PER) submittal to the BCDCOG. The PER should identify the area to be served, the proposed treatment system, and the proposed method of disposing of the treated effluent. In addition to the technical information regarding the system and its operation, the PER would need to address long term ownership, operations and maintenance. The PER would also need to document conformance with Charleston County's existing land use regulations as well as address any agreements with the County to insure the long-term financial viability of the system.
2. Public Notice/Public Meeting – Major Amendments require public input. Applicant must coordinate the public meeting location, date and time with the BCDCOG. The meeting must be publicly-noticed in a newspaper that is distributed in the area affected by the proposed amendment. A ten-day comment period will remain open following the meeting to receive public comments.
3. Responsiveness summary – Applicant prepares a responsiveness summary to address any/all public comments, if received.
4. BCDCOG Technical Advisory Committee review and recommendation.
5. BCDCOG Environmental Committee review and recommendation.
6. Full BCDCOG Board of Director's review and recommendation of amendment adoption.

Please be reminded that Charleston County serves as the Designated Management Agency (DMA) for the unincorporated areas of the county that are not currently being served by water/sewer infrastructure, which includes the location of the proposed project. It is our understanding that you are in the process of obtaining a new/revised development agreement with Charleston County. You will also need to obtain 208 approval from the County.

We look forward to assisting you with this process. If you have any questions or need additional information, please don't hesitate to contact me.

Sincerely,

Ronald E. Mitchum
Executive Director