

4.0 The Plant and Directly Associated Facilities

This chapter provides descriptions of the proposed CCC Project, key electrical generating facilities and systems and their operation, and the directly associated facilities on the Site. The descriptions include estimates of the expected character, quality, and quantity of discharges and emissions from the plant operations. In addition, proposed measures and systems to control and, as necessary, treat the expected discharges and emissions are described to provide reasonable assurance that the plant operations will comply with applicable nonprocedural regulatory requirements and standards. Chapter 9.0 provides detailed descriptions of the off-Site associated transmission line and water pipeline facilities.

The descriptions presented in this chapter are based on currently available plans and conceptual engineering and design information for the Project.

4.1 Background

DEF's proposed CCC Project will involve the construction and operation of a new 1,640-MW (nominal) electrical power generating facility and on-Site associated facilities on an approximately 400-acre Site in Citrus County. The Site is located adjacent to the east of and directly adjacent to DEF's existing CREC and adjacent to the north of the DEF-owned approximately 1,330-ft-wide transmission line and road corridor running east from CREC. The power plant will consist of two 820-MW (nominal) two-on-one natural gas-fired combined cycle units. Construction activities for the Project are scheduled to begin in January 2016, and commercial operation is scheduled for May 2018 for the first unit and December 2018 for the second unit. The Project also includes several associated linear facilities that will run within a corridor off of the Site, including 500- and 230-kV transmission lines and cooling water makeup and blow-down, flow augmentation water, and well water pipelines. These off-Site linear facilities will all be contained within a corridor on DEF's existing CREC property and are fully addressed in Chapter 9.0.

Each combined cycle unit will consist of two nominal 270-MW advanced CTGs, two HRSGs, and one nominal 280-MW STG. The CTGs will be fired on natural gas only (i.e., no backup fuel oil). DEF has selected the advanced, large-frame Mitsubishi Model 501G CTG for the Project. This CTG model was used to evaluate the air emissions and impacts of the Project. In addition, DEF expects to obtain guarantees of CTG performance and air emissions within the range of emissions provided for the Mitsubishi Model 501G CTG. In the air construction permit application (see Appendix 10.2.5), DEF has requested air emissions limits that encompass the Mitsubishi Model 501G CTG expected emissions rates.

The proposed facilities include one natural gas-fired fuel gas dew point heater for each combined cycle unit to condition the natural gas and prevent condensation. DEF is also seeking certification of an inlet chiller system to cool the inlet air to each CTG. At this time, DEF does not anticipate constructing the chiller system, but such a system may be included as the final design as the Project progresses or postconstruction, should a chiller system be determined to be needed, effective, and practicable. This SCA presents information and impact analyses inclusive of construction and operation of such a system. Each HRSG will be equipped with a natural gas-fired duct burner to also improve power output. Other auxiliary equipment will include a natural gas-fired auxiliary boiler and ultra low-sulfur diesel (ULSD) fuel oil-fired firewater pump and two emergency generators.

The proposed CCC Project will be designed with technologies to minimize air emissions. The CTGs will be equipped with dry low-NO_x combustors to control NO_x air emissions. The HRSGs will be equipped with SCR systems to further reduce NO_x emissions. Emissions of SO₂, CO, VOCs, and PM will be controlled and minimized through the use of pipeline-quality natural gas and advanced combustion equipment and practices.

The proposed CCC Project will be designed to minimize the use of water. The condenser cooling system will be a closed-loop, recirculating system consisting of a new 14- (without a chiller system) or 16-cell (with the chiller system) mechanical draft cooling tower system for each combined cycle unit. Cooling tower makeup water will consist of seawater withdrawn from the existing CREC intake canal through the existing Crystal River Unit 3 intake structure. Groundwater use will be minimized through the use of seawater for cooling water. Cooling tower blowdown will be discharged via the ex-

isting CREC discharge canal through a new discharge structure. The Project will also use seawater withdrawn from the Unit 3 intake structure for flow augmentation to ensure compliance with the water quality criterion for chlorides in the cooling tower blowdown. The cooling water intake and discharge pipelines will run from the Site to the CREC canals in the existing transmission line and road corridor adjacent to the southern boundary of the Site and then on CREC property to the existing intake and discharge canals. The Project's cooling water makeup withdrawal and blowdown discharge rates will be significantly less than the previous flows with Unit 3 in operation. Process and potable freshwater needs for the Project include demineralized water for steam cycle makeup, plant service water, wash water, fire protection water, and potable water. The freshwater needs will be provided through groundwater withdrawals from existing or new replacement wells on the CREC property. The Project's freshwater needs will not increase the existing SWFWMD-approved groundwater use allocations for CREC.

Potable water for drinking, safety showers, emergency eyewash stations, and sanitary uses will be treated in a new potable water treatment facility on the Project Site. Sanitary wastewater will be disposed in a new septic tank and tile drainfield system or package plant on the Site. The septic tank system or on-Site package plant will be designed in accordance with all applicable nonprocedural requirements. Wastewater from containment areas, floor drains, and equipment drains throughout the plant facilities will be collected, treated through oil/water separators, and disposed in a new on-Site industrial wastewater (IWW) percolation pond system. Other low-volume wastewaters will also be disposed in the percolation pond system. The percolation pond system will be designed in accordance with all applicable nonprocedural requirements for industrial wastewater percolation ponds.

The stormwater management system will be designed to handle and treat the 25-year, 24-hour storm event in accordance with all applicable nonprocedural requirements, including the requirements in Chapter 62-330, F.A.C. Potential contact stormwater runoff from the power block and equipment areas will be treated through oil/water separators and routed to the on-Site percolation pond system. Noncontact stormwater runoff will be collected and routed to the stormwater detention ponds. During construction, stormwater runoff from construction laydown, parking, and support areas will be managed and treated through best management practices (BMPs).

The proposed CCC Project will be interconnected to DEF's transmission network through new 230- and 500-kV transmission line interconnections to DEF's existing 230- and 500-kV lines in the existing transmission line and road corridor adjacent to the southern boundary of the Site. No associated transmission lines for the Project will be located outside DEF's property.

Natural gas fuel for the Project will be supplied through a new, approximately 22-mile-long pipeline lateral from the Sabal Trail natural gas transmission pipeline system. The pipeline lateral, including the on-Site portion to the on-Site metering/regulating station and the station itself, will be owned, permitted, and operated by Sabal Trail; therefore, DEF is not seeking certification of the lateral and metering/regulating station (i.e., gas yard) as associated facilities in this SCA, but they are shown on Figures 4.2.0-1 and 4.2.0-2.

4.2 Site Layout

Figure 4.2.0-1 shows the overall layout of the proposed CCC Project power plant and associated facilities, including linear transmission line and water pipeline corridors, on a recent aerial photograph. The anticipated routes of the linear facilities within the corridors are shown, but the final location of water pipelines and transmission lines within the corridor will be based on final detailed design. Figure 4.2.0-2 shows the proposed facilities on the Site at a larger scale. As shown in these figures, the proposed power plant and on-Site associated facilities will be located in the eastern half of the approximately 400-acre Site. Use of the eastern portion of the Site was selected to minimize impacts to wetlands and other sensitive resources. This area has significantly fewer and smaller wetlands compared to the western portion of the Site (see Sections 3.3.5 and 3.3.6). Also, an active bald eagle nest is located in the southwestern area of the Site.

As shown in Figures 4.2.0-1 and 4.2.0-2, the two combined cycle power blocks will be located in the northern portion of the eastern Site area, as well as the mechanical draft cooling towers, water treatment facilities, administration/warehouse building, permanent parking area, and temporary construction laydown and parking areas. The 230- and 500-kV switchyard will be located in the southern portion of the area. Several

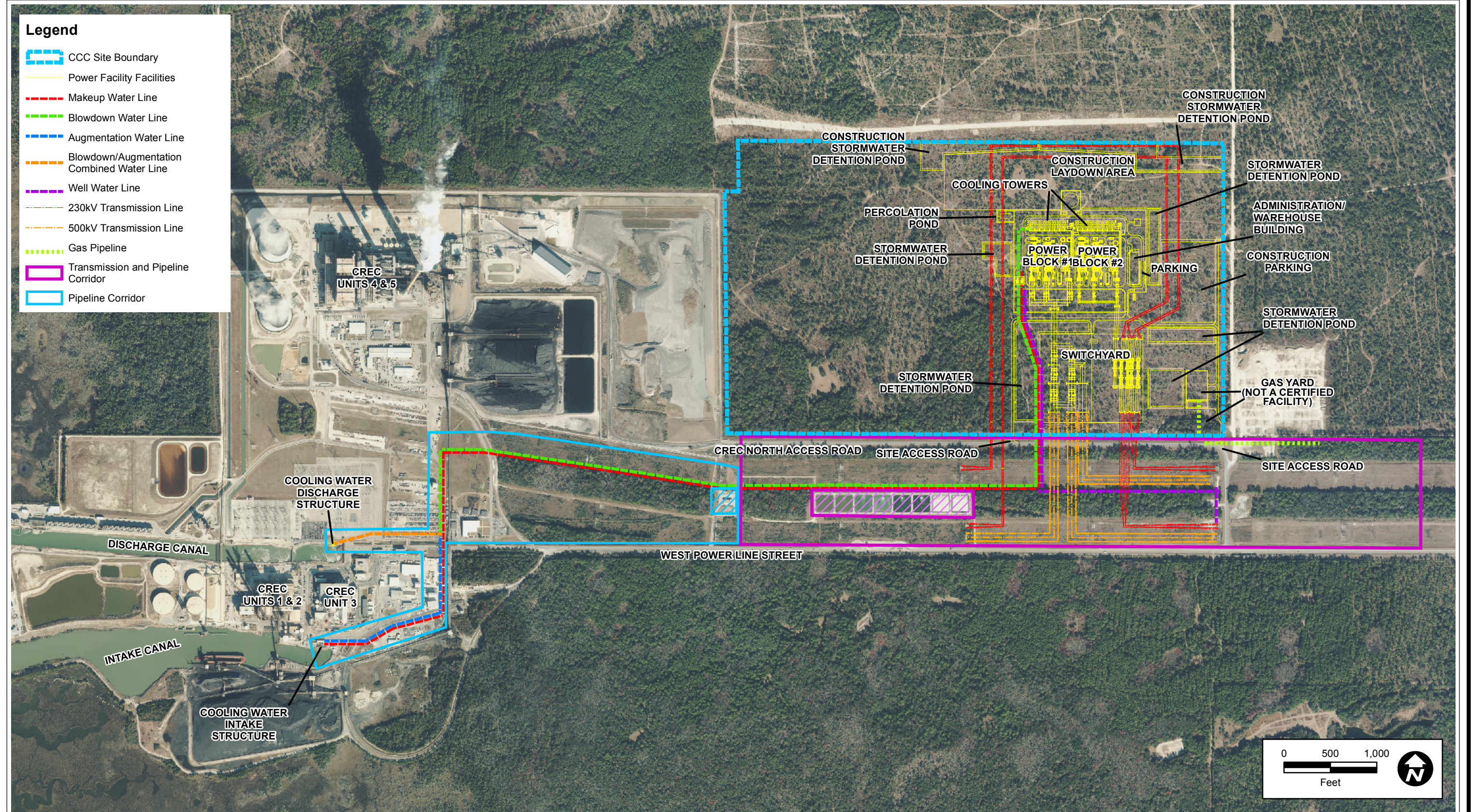


FIGURE 4.2.0-1.
OVERALL LAYOUT OF CCC FACILITIES

Sources: FDOT, 2011; AMEC, 2013; Burns & McDonnell, 2014; ECT, 2014.

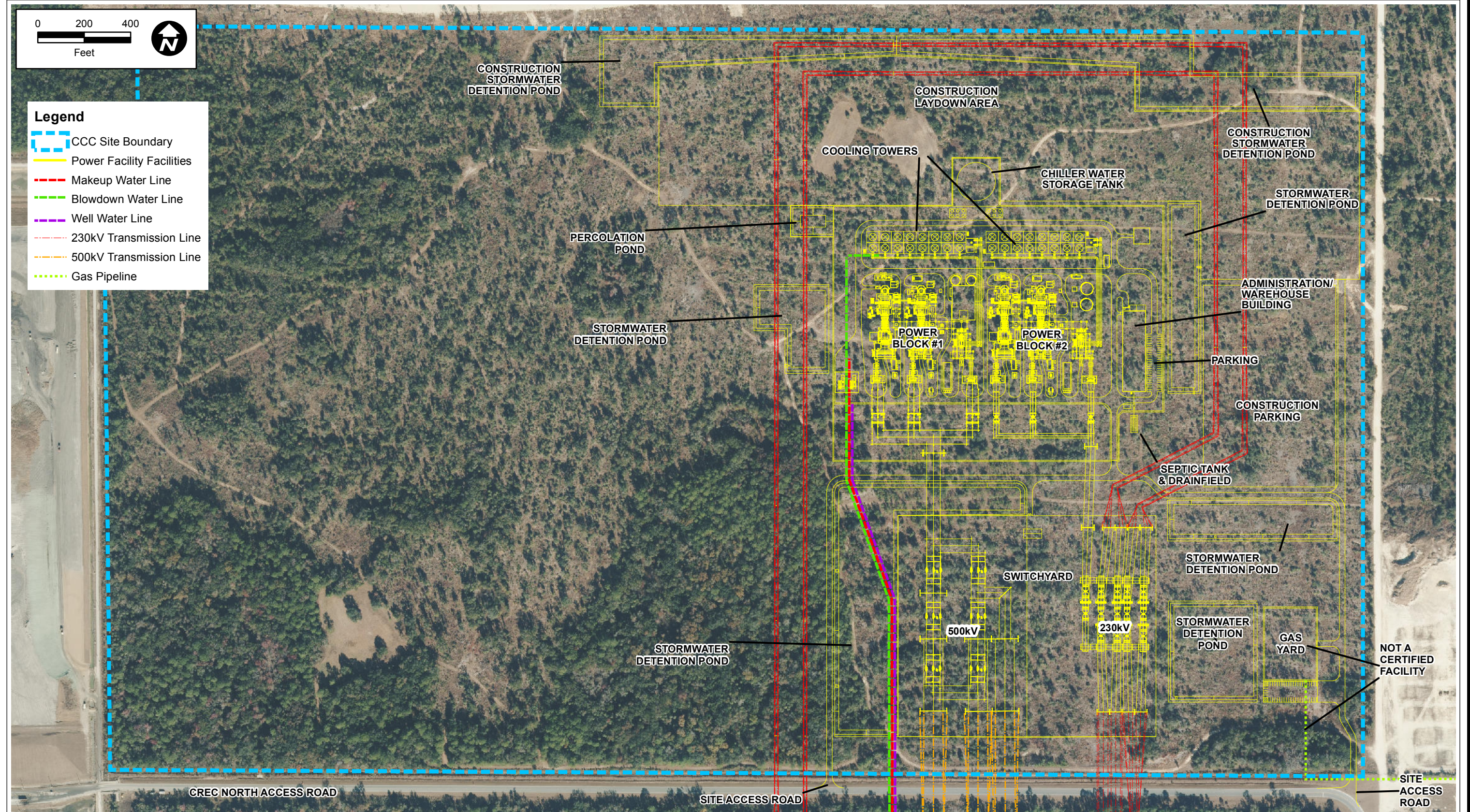


FIGURE 4.2.0-2.
DETAILED LAYOUT OF CCC FACILITIES ON THE SITE

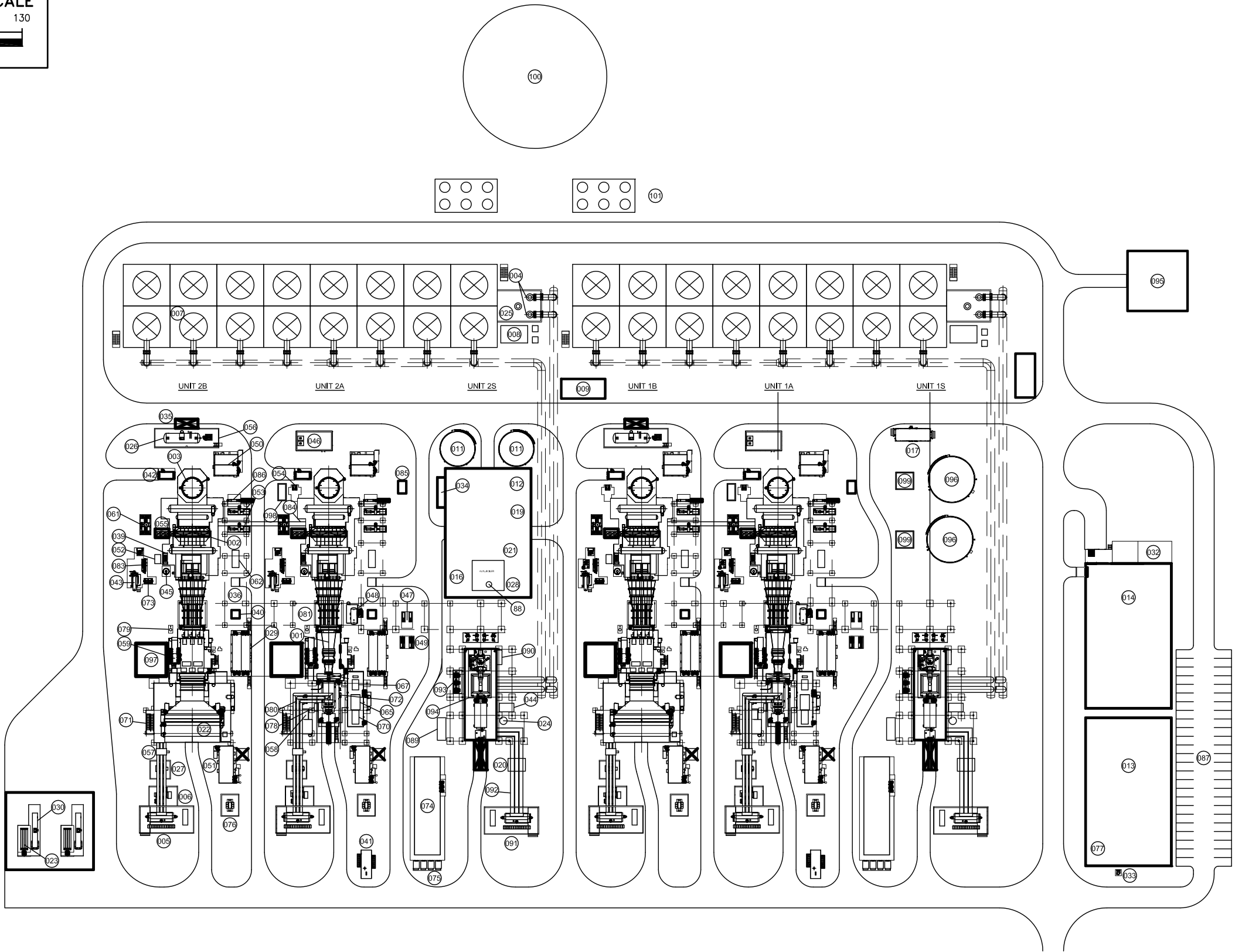
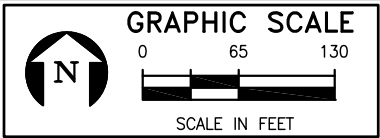
Sources: FDOT, 2011; AMEC, 2013; Burns & McDonnell, 2014; ECT, 2014.

stormwater detention ponds will be situated in the facilities area, and the wastewater IWW percolation pond system will be located west of the cooling towers. Approximately 193 acres of the approximately 400-acre Site will be disturbed by the construction activities for the Project, including the temporary construction laydown and parking areas. Given the placement of the facilities on the eastern portion of the Site, this will result in approximately 7.4 acres of wetland impacts. After construction, the construction laydown area will be seeded and allowed to revegetate to natural conditions. A portion of the construction parking area may be maintained for future DEF and contractor use during plant maintenance outages and other purposes.

The Site will be accessed via the CREC North Access Road. The primary Site access road will run from the CREC North Access Road in the southeast corner of the Site along the eastern Site boundary to the main power facilities area. In addition, DEF may utilize an existing road running parallel to the eastern boundary of the Site for Site access during Project construction and operation rather than the Site access point in the southeastern corner of the Site identified in Figure 4.2.0-2. A secondary access road from the CREC North Access Road will be located west of the switchyard.

The natural gas yard (i.e., metering/regulating station) will be located in the southeast corner of the Site. The natural gas pipeline will also enter in the southeast corner of the Site and run along the access road to the gas yard. As discussed previously, the off-Site lateral and on-Site portion of the natural gas pipeline running to the metering/regulating station and the on-Site metering/regulating station itself, will be permitted, owned, operated, and maintained by Sabal Trail. DEF is, therefore, not seeking certification of the natural gas yard in this SCA.

Figure 4.2.0-3 provides a detailed general site arrangement for the electrical generating facilities, including equipment identification legend. This figure shows the locations of the air emissions sources, including the four HRSG exhaust stacks, cooling towers, two fuel gas heaters, auxiliary boiler, diesel firewater pump, and two emergency diesel generators. Table 4.2.0-1 provides the approximate dimensions of the major buildings, equipment, and structures for the proposed Project, and Figure 4.2.0-4 shows the site elevation profile of the power plant facilities. As shown in the table and figure, the tallest structures will be the four HRSG exhaust stacks at approximately 180 ft above grade and the four HRSG structures at approximately 115 ft



EQUIPMENT IDENTIFICATION AND LOCATION LIST	
001	GAS TURBINE GENERATOR (GTG)
002	HEAT RECOVERY STEAM GENERATOR (HRSG)
003	HRSG STACK
004	CIRCULATING WATER PUMPS
005	GT GSU
006	UNIT AUX TRANSFORMER
007	COOLING TOWER
008	COOLING TOWER PDC
009	COOLING TOWER CHEMICAL FEED ENCLOSURE
010	NOT USED
011	DEMINERALIZED WATER TANK
012	SERVICE ENCLOSURE
013	ADMIN BUILDING / SHOP
014	WAREHOUSE
015	NOT USED
016	BOILER CHEMICAL FEED SYSTEM
017	FIRE PUMP ENCLOSURE
018	NOT USED
019	WATER TREATMENT SYSTEM
020	ST PT SURGE CUBICLE
021	AIR COMPRESSOR
022	INLET AIR FILTER
023	H2 STORAGE WITH SUN SHADE
024	MISC. DRAINS TANK
025	AUXILIARY COOLING WATER PUMP
026	AMMONIA STORAGE
027	GTG EXCITATION TRANSFORMER
028	AUX. BOILER
029	GTG ELECTRICAL ENCLOSURE
030	H2 TRUCK UNLOADING
031	NOT USED
032	LOADING DOCK
033	SANITARY LIFT STATION
034	COMPRESSED AIR TRIM COOLERS
035	TRUCK UNLOADING
036	NITROGEN STORAGE PAD
037	NOT USED
038	NOT USED
039	HRSG STARTOWER
040	PHOSPHATE FEED ENCLOSURE
041	EMERGENCY DIESEL GENERATOR
042	CEMS ENCLOSURE
043	FUEL GAS PERFORMANCE HEATER
044	CONDENSATE FILTER/POLISHER
045	HRSG BLOWDOWN TANK
046	WASTEWATER COLLECTION SUMP (BELOW GRD)
047	CLOSED COOLING WATER PUMPS
048	COW HEAD TANK (ON PIPE RACK)
049	COW HEAT EXCHANGERS
050	HRSG PDC
051	GTG STARTING SYSTEM ELECTRICAL ENCLOSURE
052	HRSG ELEVATOR
053	BOILER FEED PUMPS
054	FUEL GAS COLESCING FILTER
055	CATALYST REMOVAL AREA
056	AMMONIA FORWARDING PUMPS
057	GTG MAIN CIRCUIT BREAKER
058	GTG EXCIT ELECTRICAL ENCLOSURE
059	GTG FUEL GAS ENCLOSURE
060	NOT USED
061	AMMONIA FLOW CONTROL
062	SAMPLE PANEL ENCLOSURE
063	NOT USED
064	NOT USED
065	GTG LUBE OIL UNIT
066	NOT USED
067	GTG CONTROL OIL UNIT
068	NOT USED
069	NOT USED
070	GTG AUXILIARY ENCLOSURE
071	GTG STAIR TOWER
072	GTG LOOP SEAL TANK
073	GTG FUEL GAS INLET FILTER
074	MAIN PDC
075	MAIN PDC BUS TRANSFORMERS
076	GTG STARTING SYSTEM TRANSFORMER
077	CONTROL ROOM
078	GTG NGR CUBICLE
079	GTG BLADE WASHING DRAINS TANK (BELOW GRADE)
080	GTG CO2 FIRE PROTECTION SKID
081	GTG BLADE WASH SKID
082	NOT USED
083	DUCT BURNER SKID
084	OVERHEAD WALKWAY PLATFORM
085	CO2 STORAGE ENCLOSURE
086	FGH AFTER COOLER
087	PARKING
088	AUX BOILER STACK
089	ST AREA STAIR TOWER
090	STG LUBE OIL SKID
091	ST GSU
092	ST ISOPHASE BUS DUCT
093	CONDENSATE PUMPS
094	STEAM TURBINE ENCLOSURE
095	OIL STORAGE ENCLOSURE
096	SERVICE / FIREWATER TANK
097	GTG CRANE PAD
098	FUEL GAS DEWPOINT HEATER
099	SERVICE WATER PUMPS
100	CHILLED WATER STORAGE TANK (POTENTIAL)
101	CHILLER MODULE/COOLING TOWER (POTENTIAL)

FIGURE 4.2.0-3.
GENERAL ARRANGEMENT OF CCC FACILITIES

Sources: Burns & McDonnell, 2014; ECT, 2014.



Table 4.2.0-1. Approximate Dimensions of Major Structures and Facilities

Figure 4.2.0-3 Reference	Description	Structure (ft)			
		Height Above Grade	Width	Length	Diameter
1	Gas turbine generator	32	50	45	
2	HRSB	115	45	115	
3	HRSB stack	180			22
5	Gas turbine generator SU	32	25	18	
7	Cooling tower	58	95	440	
11	Demineralized water tank	40			40
12	Service enclosure	20	100	150	
13	Administration building	15	100	160	
14	Warehouse/shop	25	100	160	
17	Firewater pump enclosure	12	15	40	
22	Inlet air filter	95	65	60	
41	Emergency diesel generator	12	12	32	
50	HRSB PDC	20	25	25	
94	Steam turbine enclosure	75	40	105	
95	Oil storage enclosure	16	70	70	
96	Service/firewater tank	50			50
100	Chiller storage tank (if constructed)	80			170
Throughout plant	Pipe rack	55	30	Varies	

Source: Burns & McDonnell, 2014.

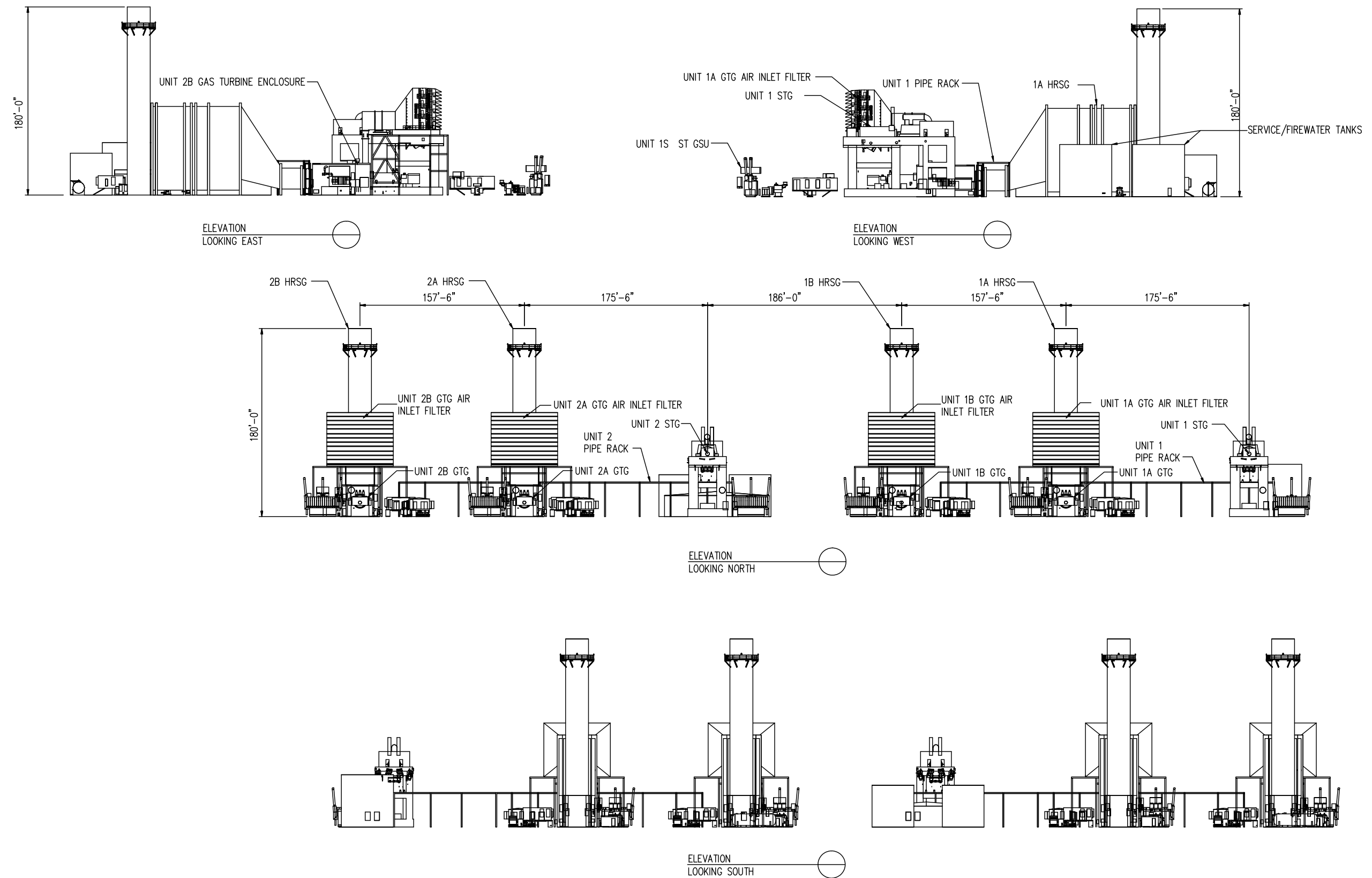


FIGURE 4.2.0-4.

SITE ELEVATION PROFILES OF CTG/HRSG/STG TRAINS

Sources: Burns & McDonnell Engineering Company, Inc., 2014; ECT, 2014.

above grade. The tallest structures for the proposed CCC Project will be significantly shorter than some of the existing CREC structures. For example, the existing exhaust stacks for Units 1 and 2 and for Units 4 and 5 are approximately 500 ft and 600 ft tall, respectively. Also, the existing natural draft cooling towers for Units 4 and 5 are approximately 460 ft in height compared to the heights of the mechanical draft cooling towers for the proposed CCC Project of approximately 58 ft.

Figure 4.2.0-5 presents several conceptual rendering views of the proposed Project power plant facilities. Based on the Site location and surrounding land uses (i.e., heavily wooded areas and the existing CREC power plant and Holcim limestone mine with controlled accesses), it is anticipated that the new Project structures will only be visible to the public from viewpoints along the existing CREC North Access Road and West Power Line Street.

4.3 Fuel

Key factors in DEF's decision to select the combined cycle technology for the proposed Project to meet its future power needs were fuel availability and costs and the use of proven, highly efficient technology. Use of natural gas will enable DEF to take advantage of competitive fuel pricing and availability opportunities in the future marketplace to provide low-cost, reliable electricity to its customers.

4.3.1 Natural Gas

For the CCC Project, natural gas will be the only fuel fired in the four CTGs, four HRSG duct burners, and two dew point fuel heaters. The natural gas fuel will be supplied from the Sabal Trail natural gas pipeline system. Table 4.3.1-1 depicts the typical composition of pipeline-quality natural gas. The heat content of natural gas is typically approximately 22,600 British thermal units per pound (Btu/lb), higher heating value (HHV). For air permitting, FDEP recommends that the estimates of SO₂ emissions be conservatively based on a maximum natural gas sulfur content of 2.0 grains per 100 standard cubic feet (gr/100 scf), while, in practice, pipeline-quality natural gas typically has a sulfur content of less than 1.0 gr/100 scf.



AERIAL VIEW FROM SOUTHEAST



VIEW FROM EAST

FIGURE 4.2.0-5. (Sheet 1 of 2)

CONCEPTUAL RENDERING VIEWS OF CCC PROJECT FACILITIES

Sources: DEF, 2014. ECT, 2014.





VIEW FROM NORTH



VIEW FROM SOUTHWEST

FIGURE 4.2.0-5. (Sheet 2 of 2)

CONCEPTUAL RENDERING VIEWS OF CCC PROJECT FACILITIES

Sources: DEF, 2014. ECT, 2014.



Table 4.3.1-1. Typical Natural Gas Composition

Gas Composition	Mole Percent (by volume)
Pentane (C ₅ H ₁₂)	0.007 to 0.030
Propane (C ₃ H ₈)	0.16 to 0.30
Butane (C ₄ H ₁₀)	0.011 to 0.017
Hexane (C ₆ H ₁₄)	0.03
Nitrogen (N ₂)	0.27 to 0.45
Methane (CH ₄)	96.0 to 97.0
Carbon dioxide (CO ₂)	0.44 to 0.88
Ethane (C ₂ H ₆)	1.6 to 2.6
Heptane (C ₇ H ₁₆)	0.01
Other characteristics	
Heat content (HHV)	22,600 Btu/lb; 1,020 Btu/scf
Sulfur content	2.0 gr/100 scf*
Water vapor (H ₂ O)	0.6 lb/MMscf

Note: Btu/lb = British thermal unit per pound.
 Btu/scf = British thermal unit per standard cubic foot.
 gr/100 scf = grain per 100 standard cubic feet.
 HHV = higher heating value.
 lb/MMscf = pound per million standard cubic feet.

*FDEP-recommended maximum value for air permitting purposes.

Sources: DEF, 2014.
 ECT, 2014.

The efficiency of electric production in a combined cycle power plant is affected by ambient temperature, with higher temperatures resulting in less efficient power production. Therefore, greater natural gas consumption will occur at lower ambient temperatures. For the CCC Project, fuel use will also be affected by whether the HRSG duct burners are fired or not. Table 4.3.1-2 provides indicative estimates of the total average and maximum natural gas fuel consumption for the Project.

No on-Site storage will be provided for the natural gas.

Table 4.3.1-2. Indicative Estimates of Hourly Natural Gas Fuel Consumption Rates

Operating Mode	Burn Rate (lb/hr)
Average Burn Rate	
100-percent load 68.6°F ambient temperature - Duct burners 75-percent unfired and 25-percent fired	504,871
Maximum Burn Rate	
100-percent load 17.2°F ambient temperature - Duct burners 100-percent fired	597,254

Source: Burns & McDonnell, 2014.

4.3.2 ULSD Fuel Oil

ULSD fuel oil will be used as fuel for the emergency diesel firewater pump and the two emergency diesel generators. Table 4.3.2-1 presents the typical composition of ULSD fuel oil. The ULSD fuel oil will have a maximum sulfur content of 0.0015 percent by weight. All storage tanks will be above ground and will comply with Chapter 62-762, F.A.C.

Table 4.3.2-1. Typical ULSD Fuel Oil Composition

Component	Maximum
Carbon residue on 10-percent bottoms	0.25 weight percent
Water and sediment	0.50 percent volume
Vanadium	1.5 ppm
Calcium	4.0 ppm
Sulfur	0.0015 weight percent
Ash	100 ppm
Lead	1.0 ppm
Heat content (HHV) (minimum)	130,000 Btu/gal

Note: Btu/gal = British thermal unit per gallon.
HHV = higher heating value.
ppm = part per million.

Source: ECT, 2014.

The quantity of ULSD fuel oil used for the Project operations will depend on the number of hours that the emergency equipment is operated. Typically, the emergency diesel firewater pump and generators will only be operated for periodic routine testing purposes. For air permitting, the emergency firewater pump and generators are assumed to be operating for a maximum of 100 hours per year (hr/yr).

ULSD fuel oil will be delivered to the Site by tanker trucks. For the emergency diesel firewater pump, ULSD fuel oil will be stored in an approximately 600-gallon day tank located within the firewater pump enclosure. Fuel oil for each of the emergency generators will be stored in an approximately 1,400-gallon tank located within the generator enclosure. The storage tanks will be double-walled with leak detection and appropriately designed spill containment.

4.4 Air Emissions and Controls

4.4.1 Air Emissions Units

The CCC Project will consist of the following air emissions units:

- Four CTGs, Mitsubishi Model 501GAC, fired exclusively with pipeline-quality natural gas.
- Four HRSGs equipped with duct burners fired exclusively with pipeline-quality natural gas.
- One auxiliary boiler, rated at 216.2 million British thermal units per hour (MMBtu/hr), fired exclusively with pipeline-quality natural gas.
- Two fuel gas dew point heaters rated at 11.2 MMBtu/hr and fired exclusively with pipeline-quality natural gas.
- Two emergency diesel generators rated at 1,500 kilowatts (kW) each and fired exclusively with ULSD fuel oil.
- One emergency diesel firewater pump, rated at 377 kW and fired exclusively with ULSD fuel oil.
- Two 14- or 16-cell mechanical draft cooling towers, one per power block.
- Two six-cell inlet air chiller cooling towers, one per power block, should a chiller system be constructed.

NO_x emissions from combustion sources, including CT/HRSGs, auxiliary boiler, fuel gas dew point heater, and emergency internal combustion engines, will consist of two components: oxidation of combustion air atmospheric nitrogen (thermal NO_x and prompt NO_x) and conversion of chemically bound fuel nitrogen (fuel NO_x).

Thermal NO_x results from the oxidation of atmospheric nitrogen under high temperature combustion conditions. The amount of thermal NO_x formed is primarily a function of combustion temperature and residence time, air/fuel ratio and, to a lesser extent, combustion pressure.

Prompt NO_x is formed near the combustion flame front from the oxidation of intermediate combustion products such as nitrogen and nitric oxide. Prompt NO_x comprises a small portion of total NO_x in conventional near-stoichiometric combustors but increases under fuel-lean conditions. Prompt NO_x, therefore, is an important consideration with respect to low NO_x combustors that use lean fuel mixtures. Prompt NO_x levels may also become significant with ultra low-NO_x burners.

Fuel NO_x arises from the oxidation of nonelemental nitrogen contained in the fuel. The conversion of fuel bound nitrogen (FBN) to NO_x depends on the bound nitrogen content of the fuel. In contrast to thermal NO_x, fuel NO_x formation does not vary appreciably with combustion variables, such as temperature or residence time.

CO emissions result from incomplete combustion of carbon and organic compounds. Factors affecting CO emissions include firing temperatures, residence time in the combustion zone, and combustion chamber mixing characteristics. Because higher combustion temperatures will increase oxidation rates, emissions of CO will generally increase during turbine partial load conditions when combustion temperatures are lower.

VOC emissions also result from incomplete combustion of carbon and organic compounds. The same factors that affect CO emissions generally are the same factors that affect VOC emissions.

PM/PM₁₀/PM_{2.5} emissions from fuel-burning equipment result when hydrocarbons are not completely combusted or when sulfur and nitrogen in the fuel are oxidized and

postcombustion aerosols are formed. Formation of sulfate aerosols is common when burning high-sulfur fuel oils and using ammonia injection to control NO_x with SCR technology. Most of these aerosols are in the form of fine particulates (i.e., $\text{PM}_{2.5}$). $\text{PM}_{2.5}$ emissions from natural gas combustion are typically much less than emissions from fuel oil combustion, because natural gas contains less sulfur and nitrogen.

SO_2 emissions from fuel burning equipment are a direct result of the sulfur content of the fuel combusted. During the combustion process, sulfur contained in the fuel is converted to SO_2 and further oxidized into sulfur trioxide. Ammonia, injected into the exhaust gas stream in the SCR to reduce NO_x emissions, can combine with sulfur trioxide to form ammonium sulfates.

4.4.1.1 CTG/HRSG Units

Potential annual emissions for the CCC Project were developed based on all four CTGs operating 8,760 hr/yr and the HRSG duct burners operating 4,000 hr/yr. The CTGs and the HRSG duct burners will be fired exclusively with pipeline-quality natural gas. The CTGs will be equipped with dry low- NO_x combustors. An SCR will be used to control NO_x emissions from the CTG/HRSGs.

4.4.1.2 Auxiliary Boiler and Fuel Gas Dew Point Heaters

The CCC Project will include an auxiliary boiler and two fuel gas dew point heaters having nominal heat input ratings of 216.2 and 11.2 MMBtu/hr, respectively. Potential annual emissions from the auxiliary boiler will be based on operating 2,000 hr/yr, and the emissions from the fuel gas dew point heaters will be based on operating 8,760 hr/yr. These combustion sources will be fired exclusively with pipeline-quality natural gas and will control emissions using good combustion practices.

4.4.1.3 Emergency Firewater Pump and Generator Diesel Engines

The CCC Project will include two emergency diesel generators and one emergency firewater pump. The emergency diesel engines will be rated for 1,500 kW each and will be driven by a nominal 2,220-horsepower diesel engine. The emergency generators will supply power to essential service motor control centers during any interruption of electrical power supply to the CCC Project. The emergency firewater pump will be driven by a nominal 575-horsepower diesel engine. The firewater pump will provide water for use in abating fires that may occur during emergencies at the Site.

All three emergency diesel engines will be fired exclusively with ULSD fuel oil and will meet emissions standards of 40 CFR 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Excluding operation during emergency conditions, the emergency diesel engines will each be operated for a maximum of 100 hr/yr for routine testing and maintenance. Potential annual emissions are based on operating 500 hr/yr in accordance with EPA guidance.

4.4.1.4 Cooling Towers

The CCC Project will include two 14- or 16-cell mechanical draft cooling towers (one for each two-on-one combined cycle power block) to dissipate heat from the Project steam cycle. The cooling towers will be operated at 1.3 cycles of concentration to minimize scaling. Seawater withdrawn via the existing CREC intake canal at the former Crystal River Unit 3 cooling water intake structure will be used as makeup water to replace losses due to evaporation from the cooling towers. Cooling tower blowdown will be augmented with water from the intake canal to ensure that the chloride concentrations are increased by no more than 10 percent above the source water concentration, per Florida's water quality criterion for chlorides.

In addition to the two 14- or 16-cell cooling towers, if an air chiller system is constructed, the CCC Project will also include two small six-cell mechanical draft cooling towers for the inlet air chillers. These cooling towers would initially use plant service water as makeup during startups, then use recycled condensate water produced in the chilling process.

PM/PM₁₀/PM_{2.5} emissions will occur from the cooling towers as a result of water being entrained in the air stream. Evaporative cooling towers, such as these, rely on the latent heat of water evaporation to exchange heat between the process and the air passing through the cooling tower. Because of direct contact between the cooling water and ambient air, a small portion of the recirculating cooling water is entrained in the air stream and discharged from the cooling tower as drift droplets. These water droplets contain the same concentration of dissolved solids as found in the recirculating cooling water. Large water droplets quickly settle out of the cooling tower exhaust stream and deposit near the tower. The remaining smaller water droplets may evaporate prior to being deposited in the area surrounding the cooling tower. These evapo-

rated droplets represent potential PM/PM₁₀/PM_{2.5} emissions because of the PM/PM₁₀/PM_{2.5} formed by crystallization of the dissolved solids contained in the droplet.

The CCC Project cooling towers will be equipped with high-efficiency drift eliminators that will limit the drift loss rate to 0.0005 percent of the recirculating cooling water. This represents the most effective method of reducing the amount of drift and, thus, PM/PM₁₀/PM_{2.5} emissions from cooling towers.

A PSD netting analysis was conducted to determine the CCC Project's net air emissions increase (or decrease) based on the air emissions increase from all of the air emissions units for the CCC Project (including the cooling towers associated with the potential construction of the air inlet chiller system) and the air emissions decrease due to permanently shutting down CREC Units 1 and 2 in conjunction with the commercial operation of the Project units. The netting analysis includes the PM emissions from the cooling towers associated with the potential construction of the inlet air chiller systems. The air emissions decrease due to permanently shutting down CREC Units 1 and 2 were based on the highest actual annual emissions during any consecutive 24-month period within the 5-year period immediately preceding submittal of the SCA application. Table 4.4.1-1 presents a summary of the PSD netting analysis for the Mitsubishi Model 501GAC CTG and auxiliary emissions sources.

Table 4.4.1-1 presents the annual potential emissions for the CCC Project based on the Mitsubishi Model 501GAC CTG. These annual potential emissions are compared to PSD significant emissions rates, which are thresholds for triggering PSD review. Since the CCC Project is located at an existing major source, PSD review is required for any pollutant with a net emissions increase greater than the listed PSD significant emissions rate for that pollutant.

As shown in Table 4.4.1-1, due to the substantial reduction in actual emissions resulting from the future shutdown of CREC coal-fired Units 1 and 2, the net change in emissions is less than the PSD significant emissions rate for all pollutants, except for greenhouse gases (GHGs) (as carbon dioxide equivalent [CO₂e]). A recent U.S. Supreme Court decision (Util. Air Regulatory Grp. v. EPA, No. 12-1146 [June 23, 2014]) concluded that a facility could not be subject to PSD review solely based on CO₂ emissions. The Court also held that, if the project triggers PSD for other pollutants, EPA has the

authority to impose best available control technology for GHGs. Because the CCC Project is not subject to PSD review for any other PSD pollutant and it cannot trigger PSD review solely based on GHG emissions, PSD review is not required for the CCC Project.

Table 4.4.1-1. PSD Applicability Netting Analysis Results

Pollutant	Net Change in Emissions (tpy)	PSD Significant Emissions Rate (tpy)	PSD Review Required?
CO	-3,148	100	No
NO _x	-3,747	40	No
SO ₂	-28,897	40	No
PM	-562	25	No
PM ₁₀	-1,766	15	No
PM _{2.5}	-1,439	10	No
VOC	14	40	No
Lead	-0.38	0.6	No
Fluorides	Negligible	3	No
H ₂ SO ₄ mist	-49	7	No
Hydrogen sulfide	Negligible	10	No
Total reduced sulfur	Negligible	10	No
Reduced sulfur compounds	Negligible	10	No
Municipal waste combustor			
Organics	Not applicable	3.5×10^{-6}	No
Metals	Not applicable	15	No
Acid gases	Not applicable	40	No
Municipal solid waste landfills*	Not applicable	50	No
Mercury	-0.07	0.1	No
GHG (as CO ₂ e)	1,766,553	—	No†

Note: H₂SO₄ = sulfuric acid.

Emissions rate calculations are provided in the PSD application.

*Nonmethane organic compounds

†See Util. Air Regulatory Grp. v. EPA, Case No. 12-1146 (June 23, 2014).

Sources: Burns & McDonnell, 2014.
ECT, 2014.

DEF plans to permanently cease operation of either Unit 1 or 2 in coordination with the commercial operation of the CCC Project first combined cycle power block (currently planned for May 2018) and permanently cease operation of both Units 1 and 2

with the commercial operation of the CCC Project second combined cycle power block (currently planned for December 2018).

Table 4.4.1-2 presents the proposed emissions rates for the Mitsubishi Model 501GAC CTG.

Table 4.4.1-2. CCC Project Emissions Rates

Pollutant	Unfired	Fired
NO _x (ppmvd @ 15% oxygen)	15	15
CO (ppmvd @ 15% oxygen)	4	7
VOC (ppmvd @ 15% oxygen)	0.8	1.2
SO ₂ (ppmvd @ 15% oxygen)	1.1	1.1
(lb/hr)	16.3	16.7
PM (lb/hr)	7.9	10.5
PM ₁₀ (lb/hr)	18.7	22.2
PM _{2.5} (lb/hr)	18.7	22.2
H ₂ SO ₄ mist (lb/hr)	2.2	2.4

Note: H₂SO₄ = sulfuric acid.

Emissions rates are based on 100-percent gas turbine load at 68.6 °F.

Sources: Burns & McDonnell, 2014.
ECT, 2014.

4.4.2 Air Emissions Controls

The CCC Project design will incorporate state-of-the-art combined-cycle CTG technology and air quality emissions controls. The high thermal efficiency of the Mitsubishi Model 501GAC will reduce emissions per unit of output by producing each megawatt-hour of electricity with less fuel compared to conventional fossil fuel power generation facilities. This high thermal efficiency design will result in lower air emissions per megawatt-hour of electrical power generated.

The CTG/HRSG units will be equipped with dry low-NO_x combustors and state-of-the-art controls to minimize NO_x emissions. In addition, an SCR system will be installed to further reduce NO_x emissions. CO and VOC emissions from the CTG/HRSG units will be controlled by use of advanced combustion equipment and operational practices to obtain efficient combustion. Highly efficient combustion will, in turn, result in low CO

and VOC emissions rates. The use of pipeline-quality natural gas, along with highly efficient combustion, will limit PM/PM₁₀/PM_{2.5} emissions from the CTG/HRSG units.

SO₂ and sulfuric acid (H₂SO₄) mist emissions result from conversion of sulfur in the fuel and are minimized by the low sulfur content of the fuels proposed for the Project; i.e., pipeline-quality natural gas for the CTG/HRSG units, auxiliary boiler, and fuel gas dew point heater and ULSD fuel oil for the emergency diesel engines.

The mechanical draft cooling towers will be equipped with high efficiency drift eliminators to minimize PM/PM₁₀/PM_{2.5} emissions.

4.4.3 Control Technology

Control of air emissions from the Project will be accomplished by the use of clean fuels, good combustion controls, high thermal efficiency design, and SCR control technology. Table 4.4.3-1 presents a summary of air emissions controls for the Project.

Table 4.4.3-1. Summary of Project Air Emissions Controls

Pollutant		Control Method
CTG/HRSG	• CO and VOC • NO_x • SO₂, H₂SO₄ mist • PM/PM₁₀/PM_{2.5}	• Good combustion practice • Dry low-NO_x combustors and SCR • Pipeline-quality natural gas • Good combustion practice
Auxiliary boiler and dew point fuel gas heater	• NO_x, CO, VOC, and PM/PM₁₀/PM_{2.5} • SO₂, H₂SO₄ mist	• Good combustion practice • Pipeline-quality natural gas; good combustion practice
Cooling towers	• PM/PM₁₀/PM_{2.5}	• High efficiency drift eliminators
Emergency diesel engines	• NO_x, CO and VOC • SO₂, H₂SO₄ mist • PM/PM₁₀/PM_{2.5}	• Good combustion practice • ULSD fuel oil • Good combustion practice • Compliance with 40 CFR 60, Subpart IIII; limited hours of operation

Sources: Burns & McDonnell, 2014.
DEF, 2014.
ECT, 2014.

4.4.4 Design Data for Control Equipment

The CCC Project also includes SCR to control NO_x emissions from the CTG/HRSG. The SCR system will be designed to control NO_x emissions to meet the NO_x emissions limits specified in the NSPS for stationary CTGs, 40 CFR 60, Subpart KKKK. On January 8, 2014, EPA proposed a rule that would either revise Subparts Da and KKKK or adopt a new Subpart TTTT to address GHG emissions from new electric utility generating stationary sources. DEF acknowledges the rule will be applicable upon the effective date of the final rule and will comply with same.

4.4.5 Design Philosophy

Air emissions controls planned for the Project have been designed to fully comply with applicable state and federal regulations and minimize air emissions by using efficient generating and pollution prevention technologies.

The CCC Project will be a natural gas-fired combined cycle CTG electrical generating facility designed to replace two existing coal-fired electrical generating units. A natural gas-fired combined cycle CTG electrical generating facility represents the most energy efficient means of electrical power generation by generating the maximum electrical power output per unit of fuel combusted. By maximizing the megawatt output per unit of fuel consumed, the air pollutant emissions per megawatt output are minimized. Pollution prevention is incorporated in the design by the exclusive use of clean fuels, high efficiency combustion technology, and postcombustion control. The CTG/HRSGs, auxiliary boiler, and fuel gas dew point heater will be fired exclusively with pipeline-quality natural gas. ULSD fuel oil will be used as the sole fuel for the emergency diesel engines. Dry low-NO_x combustion will minimize NO_x emissions during the CTG combustion process, while ensuring that CO and VOC emissions are within accepted limits. SCR will be installed postcombustion to further reduce NO_x emissions.

4.5 Plant Water Use

Operation of the CCC Project will require the use of seawater withdrawn from the existing CREC intake canal and freshwater withdrawn from existing CREC Units 1, 2, and 3 groundwater wells. The primary uses of seawater will be for condenser cooling, i.e., cooling tower makeup water, and for augmentation of cooling tower blowdown for compliance purposes. The primary uses of groundwater will be for plant process and

service water and potable water needs. The proposed Project water systems will be designed to:

- Maximize water reuse and recycling.
- Minimize groundwater use and withdrawals.
- Minimize water consumption.
- Manage water quality within the plant systems.
- Minimize potential water quality impacts.

The quantities of water used in different plant systems will vary with plant operating conditions, as well as with ambient meteorological (i.e., temperature and relative humidity) conditions. The following three water balance diagrams are presented to show the estimated annual average and peak water use under different operating conditions:

- Figure 4.5.0-1, annual average daily seawater and groundwater use.
- Figure 4.5.0-2, peak month daily seawater use.
- Figure 4.5.0-3, peak month daily groundwater use.

The annual average water balance depicted in Figure 4.5.0-1 is based on annual average ambient conditions and assumed annual average operating conditions of 1,830 hours without duct firing, 4,000 hours with duct firing, and 2,930 hours of summer direct firing with the potential inlet air chillers. The peak monthly seawater use in Figure 4.5.0-2 is based on 100-percent load with duct firing under maximum ambient conditions (i.e., 98.5°F dry bulb temperature) and includes a 5-percent margin for the seawater flows. The peak month groundwater use in Figure 4.5.0-3 is based on 100-percent load with duct firing and 40°F ambient temperature. If the chiller system is not constructed, the chiller condensate supply used to augment service water shown in Figures 4.5.0-1, 4.5.0-2, and Table 4.5.0-1 would be unavailable and would be replaced by groundwater.

Table 4.5.0-1 provides a summary of the major flows for both power blocks combined in the three water balances.

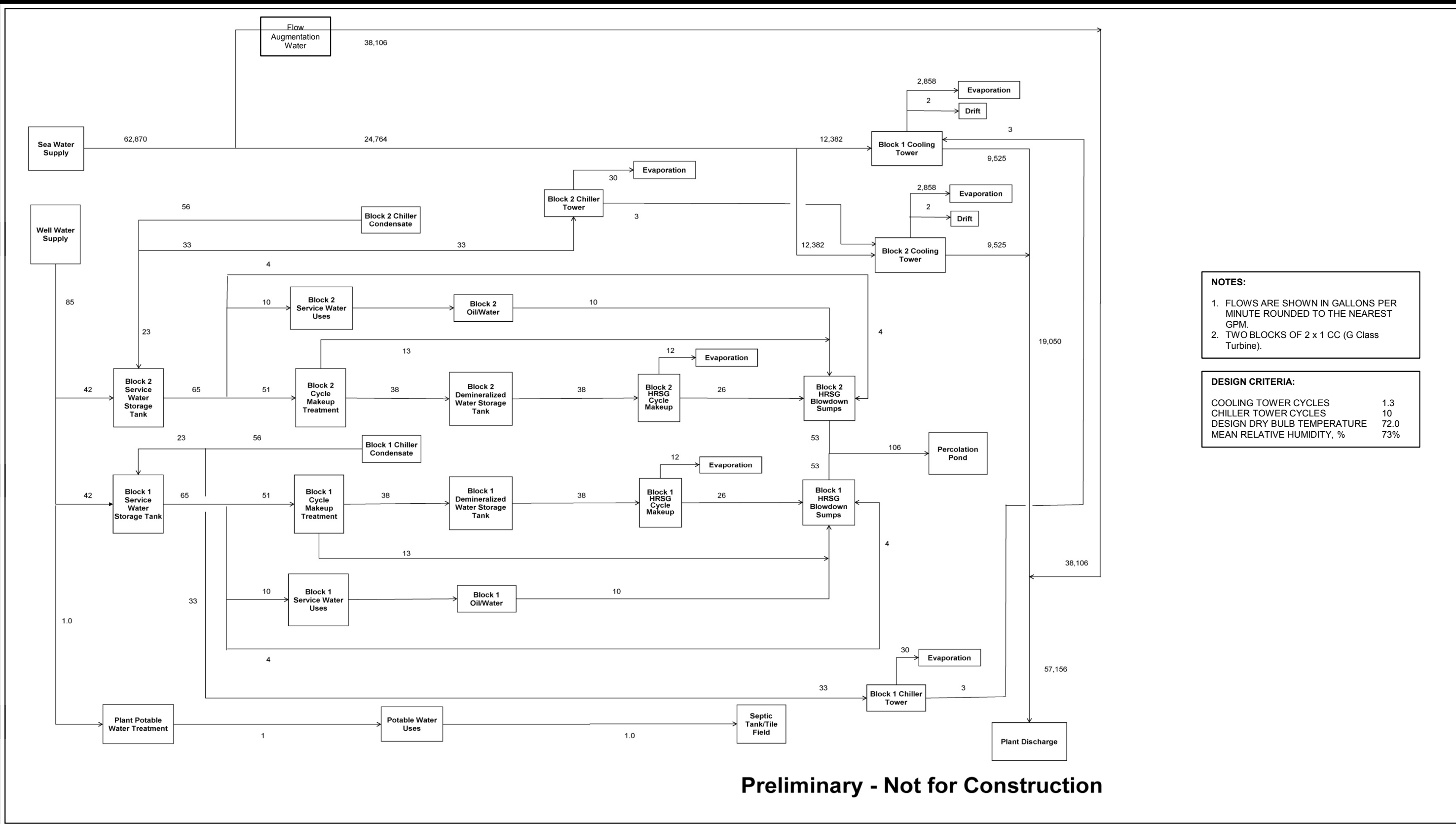
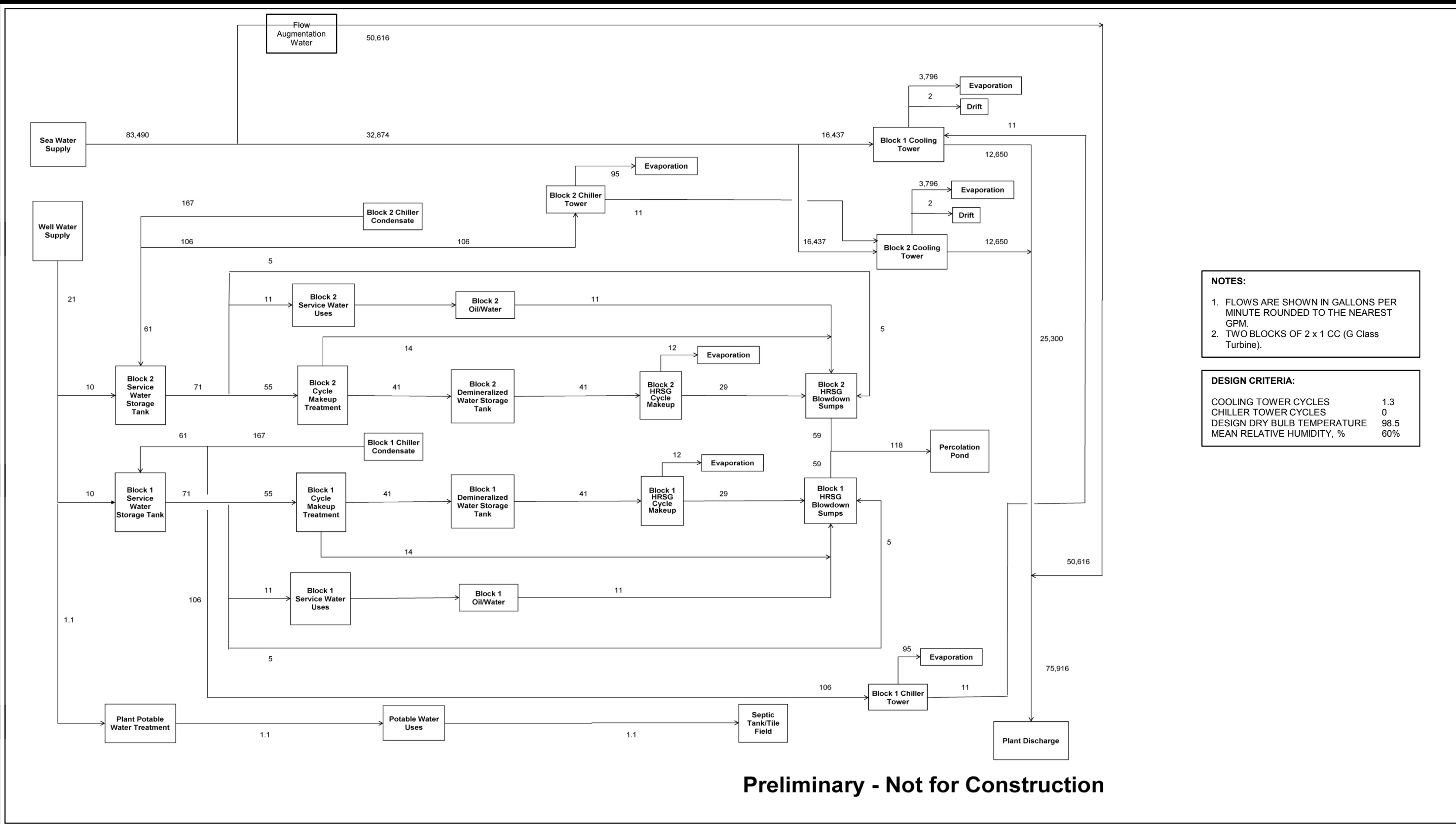


FIGURE 4.5.0-1.
WATER BALANCE FOR ANNUAL AVERAGE SEAWATER AND GROUNDWATER USE CONDITIONS

Sources: Burns & McDonnell, 2014. ECT, 2014.





NOTES:

- 1. FLOWS ARE SHOWN IN GALLONS PER MINUTE ROUNDED TO THE NEAREST GPM.
- 2. TWO BLOCKS OF 2 x 1 CC (G Class Turbine).

DESIGN CRITERIA:

COOLING TOWER CYCLES	1.3
CHILLER TOWER CYCLES	0
DESIGN DRY BULB TEMPERATURE	98.5
MEAN RELATIVE HUMIDITY, %	60%

FIGURE 4.5.0-2.
WATER BALANCE FOR PEAK MONTH SEAWATER USE CONDITIONS

Sources: Burns & McDonnell, 2014. ECT, 2014.



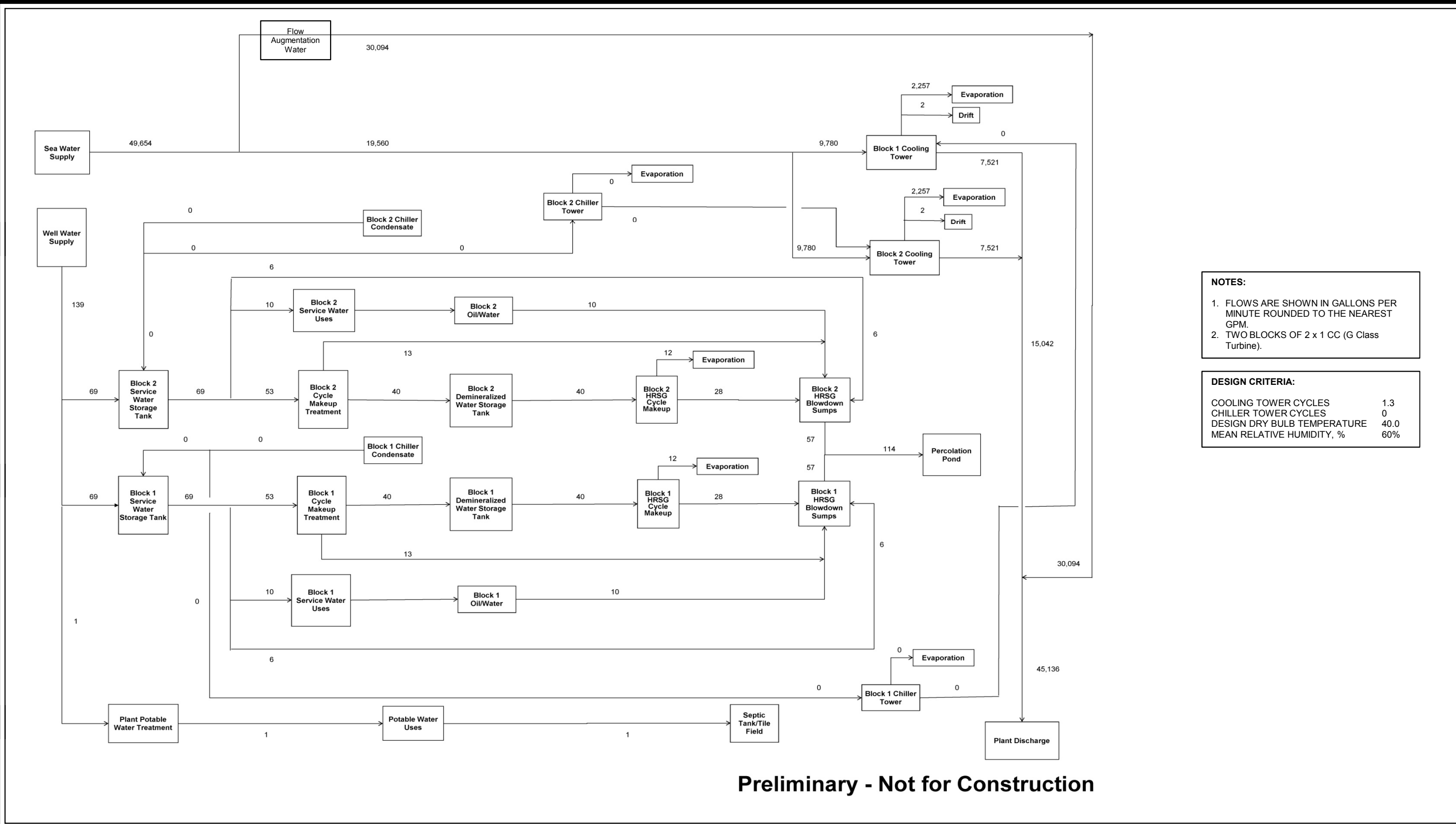


FIGURE 4.5.0-3.
WATER BALANCE FOR PEAK MONTH DAILY GROUNDWATER USE CONDITIONS

Sources: Burns & McDonnell, 2014. ECT, 2014.



Table 4.5.0-1. Summary of Major Flows/Uses in the Water Balances

Water Flow/Use	Water Use (gpm)		
	Annual Average (Figure 4.5.0-1)	Peak Seawater (Figure 4.5.0-2)	Peak Groundwater (Figure 4.5.0-3)
<u>Seawater</u>			
• Cooling tower makeup	24,764	32,874	19,560
• Augmentation water for cooling tower blowdown	38,106	50,616	30,094
• Total withdrawal	62,870	83,490	49,654
• Cooling tower evaporation	5,716	7,592	4,514
• Total discharge	57,156	75,916	45,136
<u>Groundwater</u>			
• Plant process/sanitary water	84	20	138
• Potable water	1	1.1	1
• Total withdrawal	85	21	138
• Chiller condensate reuse (potential)	112	334	0
• Total discharge to percolation pond	106	118	114

Sources: Burns & McDonnell, 2014.
ECT, 2014.

As shown in Table 4.5.0-1, use of seawater for cooling tower makeup and augmentation water for cooling tower blowdown, with a total peak combined flow of 83,490 gpm (120.2 MGD), are by far the largest plant water uses. Cooling tower makeup water is required to replace water lost through evaporation in the cooling process and blowdown to effectively manage water quality in the discharge. Seawater will also be used to manage chloride concentrations in the cooling tower blowdown. Cooling tower makeup and augmentation water will be withdrawn from the existing CREC intake canal through the existing intake structure for retired Crystal River Unit 3. Although not shown in the water balances, a small quantity of seawater will be periodically withdrawn from the intake structure bays as wash water for the traveling screens.

The peak combined cooling tower makeup and augmentation water withdrawal rate of 120.2 MGD for the proposed CCC Project is significantly less than historical withdraw-

als when Crystal River Unit 3 was operational. Prior to shutdown and ultimate permanent retirement, the once-through cooling water design withdrawal for Unit 3 was 979.2 MGD. Currently, permitted withdrawals of up to approximately 43.5 MGD of noncontact cooling water for Unit 3 are allowed for the heat decay, spent fuel pool system, with actual flows averaging approximately 16 to 18 MGD. Plans are to reduce these flows further to approximately 1 MGD on an intermittent basis only following conversion of the spent fuel pool heat decay system from a water-based to air-cooled system, which is planned for early 2015. The current design withdrawals from the intake canal for once-through cooling water for Crystal Units 1 and 2 are 446.4 and 472.3 MGD, respectively. DEF is currently planning on retiring Units 1 and 2 in coordination with the commercial operation of the CCC Project; therefore, these cooling water withdrawals will also cease in the future. The proposed cooling water system for the CCC Project will be compliant with the final Section 316(b) rule as described in Section 4.5.1.1.

As shown in Table 4.5.0-1, total groundwater withdrawals for the CCC Project will range from 21 gpm (30,240 gpd) to a peak monthly rate of 138 gpm (198,720 gpd) with an annual average of 85 gpm (122,400 gpd). The primary uses for groundwater will be for plant process/service purposes, which require higher quality water, such as demineralized water for HRSG steam cycle makeup, equipment wash water, pump seals, and fire protection water, and for potable water uses. The groundwater will be provided through withdrawals from the existing or replacement wells that serve Crystal River Units 1, 2, and 3.

Sufficient groundwater use allocations are available under Individual Water Use Permit No. 2004695.004 for Units 1, 2, and 3 issued by SWFWMD to provide the process/service and potable water needs of the CCC Project. The existing water use permit authorizes an annual average use of 1.0 MGD and a peak month use of 1.5 MGD. Historically, the combined groundwater use for Units 1, 2, and 3 were below the permitted quantities, and, since the retirement of Unit 3, the groundwater use has been approximately 650,000 gpd. Therefore, sufficient quantities of groundwater are available under the approved allocation to provide the Project needs of up to approximately 200,000 gpd, and no additional groundwater use is requested as part of this SCA.

Further, as part of this SCA, DEF is requesting that the groundwater use quantities authorized under Water Use Permit No. 2004695.004 for Crystal River Units 1, 2, and 3 be combined with groundwater withdrawal allocations approved for Units 4 and 5 in the CREC COCs. Under COC B.VIII.A, DEF is allowed to withdraw 4.309 MGD (on a rolling annual average daily flow basis) for the operational needs of Units 4 and 5. The combining of these currently separate groundwater use approvals is consistent with SWFWMD's Water Use Permit Applicants Handbook, Part B, Section 1.4.13, which expresses a preference for a single permit for withdrawals intending to serve continuous property. Therefore, as part of this SCA, DEF is requesting a total groundwater withdrawal allocation of 5.309 MGD on an annual average basis for the operation of the existing Crystal River units and the proposed CCC Project. This total allocation will allow DEF to meet its potential additional water needs for future Unit 3 decommissioning activities and/or new air emissions regulations (e.g., carbon emissions reductions) for Units 4 and 5.

For the CCC Project, DEF has carefully considered opportunities for water reuse, either from inside the plant itself or from outside the plant, and water conservation to minimize the use of groundwater. In conjunction with SWFWMD, DEF is currently implementing a project to use all reclaimed water available from the city of Crystal River to offset some groundwater use for Crystal River Units 4 and 5. No other practical sources of reclaimed water are available in the region. Similarly, potential storage and reuse of stormwater on the Site is impractical due to the size of the Site and constraints posed by wetlands and other land features. Further, the use of seawater for operation of the closed-cycle cooling and flow augmentation systems is proposed to reduce water use overall, as well as avoid use of freshwater for cooling purposes. If the potential inlet air chillers are constructed, chiller condensate will be reused in the process/service water systems and as makeup for the chiller cooling towers.

4.5.1 Heat Dissipation System

The following subsections discuss the heat dissipation system for the proposed CCC Project.

4.5.1.1 System Design

The condenser cooling system for the combined cycle units will consist of two 14- or 16-cell closed-cycle, mechanical draft cooling towers for heat dissipation. The cooling

towers will be designed to remove approximately 1.9 billion British thermal units per hour at an internal circulation rate of 270 MGD and a wet bulb temperature of 86°F (100-percent load). This will result in between 96 and 99 percent heat loss in the cooling towers to the atmosphere. The cooling towers will be supplied with seawater withdrawn from the existing CREC intake canal that has historically supplied once-through cooling water for Crystal River Units 1, 2, and 3 (Units 4 and 5 withdraw cooling water makeup water from the discharge canal and, therefore, currently reuse thermal effluent from Units 1 and 2). The intake canal is approximately 14 miles long and is diked on both sides for the first 2.9 miles, beyond which the northern dike continues for another 4.5 miles (see Figure 4.5.1-1). The canal has a dredged depth of approximately 20 ft, which allows barge delivery of coal for the four coal-fired generating units at CREC.

The discharge canal, located north of the intake canal, is approximately 2.75 miles long and has a dredged depth of approximately 10 ft. As shown on Figure 4.5.1-1, the portion of the discharge canal between its eastern end and the NPDES permit-designated point of discharge for Crystal River Units 1, 2, and 3 is approximately 1.5 miles long. Beyond that point, the canal extends another 1.75 miles into Crystal Bay, with a border of dredged material along the southern side.

The CCC Project will use the existing intake structure previously used to provide once-through condenser cooling to Crystal River Unit 3. This intake structure will also be used to supply chloride augmentation water for the Project cooling tower blowdown (see Section 4.5.1.3). The intake structure is located on the eastern end of the intake canal on its north side and is approximately 114 ft wide (see Figure 4.5.1-2). The front of the intake has 4-inch spaced bar trash racks across its mouth and has eight intake bays, seven for once-through cooling and one to supply noncontact cooling water to the Unit 3 spent fuel pool heat decay system.

Each bay is equipped with traveling screens that serve four circulating water pump bays and one nuclear service water pump. The existing traveling screens are 9 ft wide, have 0.375-inch mesh screen panels, and, at normal water elevations, have a wetted depth of 21 ft. During Unit 3 operations, the screens were rotated and cleaned using a spray wash system every 8 hours or when the head differential across the screens exceeded 6 inches. Wash water flows into a trough that discharges toward the west back

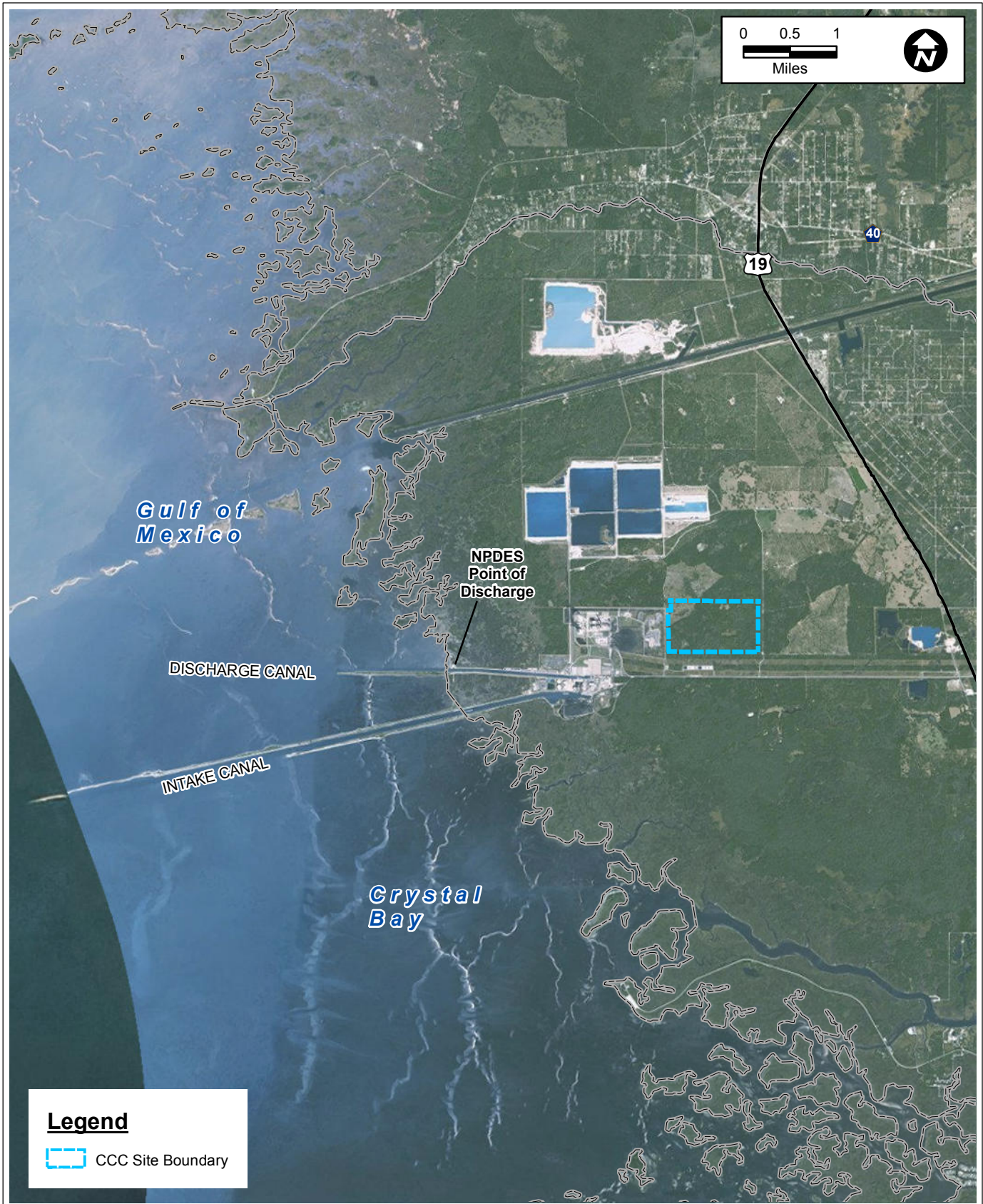


FIGURE 4.5.1-1.
EXISTING CREC INTAKE AND DISCHARGE CANALS

Sources: ESRI Street Map, 2013; FDEP, 2013; ECT, 2014.



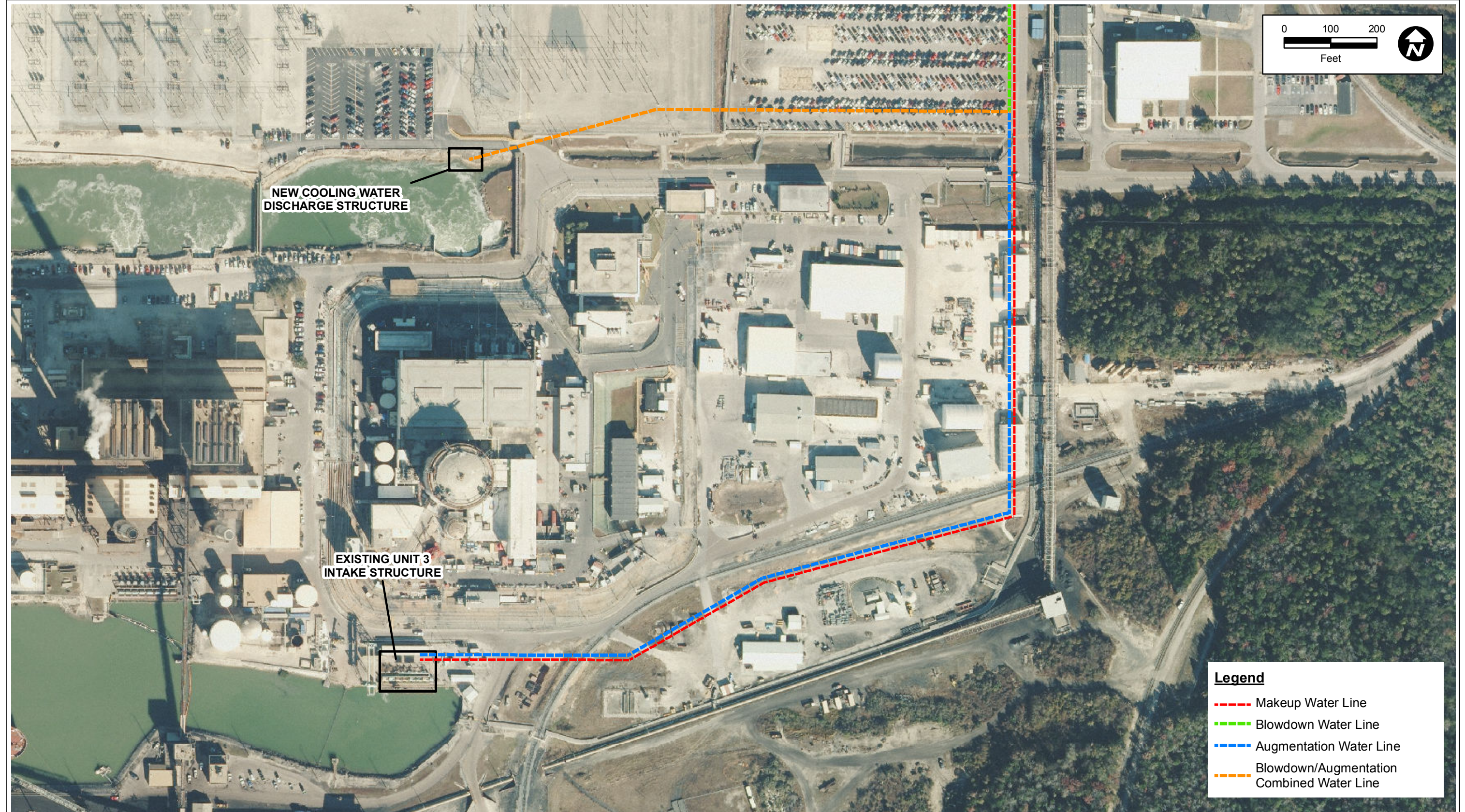


FIGURE 4.5.1-2.
CONCEPTUAL INTAKE/DISCHARGE LOCATIONS

Sources: FDOT, 2011; AMEC, 2013; Burns & McDonnell, 2014; ECT, 2014.

into the intake canal. A similar protocol is expected for the retrofitted screens for the CCC Project.

The new CCC Project intake configuration will retain the existing trash racks. Flow modeling will be performed to determine the number of bays necessary to achieve a design maximum through-screen velocity of 0.5 fps under low source water stage and maximum head differential across new Section 316(b)-compliant screens. This maximum design intake velocity is considered by EPA, in its final Section 316(b) rule for existing facilities, as one of the alternatives for best technology available (BTA) to mitigate for impingement effects at cooling water intakes (40 CFR § 125.94(b)(2)). The remaining bays will be sealed off. Any modifications of the existing intake structure are not expected to involve in-water activities.

The cooling system of the proposed CCC Project will be compliant with the recently finalized Section 316(b) rule for existing facilities. Under the definitions of the Section 316(b) rule, the CCC Project is defined as a “new” unit at an “existing” facility (40 CFR § 125.92(u)). As such and under 40 CFR § 125.94(e), to meet BTA for impingement and entrainment, the new unit must either: (1) “reduce the design intake flow for the new unit, at a minimum, to the a level commensurate with that which can be attained by the use of closed-cycle recirculating system;” or (2) under an alternative approach, “reduce the level of adverse environmental impact from any cooling water intake structure to a level comparable to a closed-cycle system.”

The proposed CCC Project will use a closed-cycle recirculating system to meet CWA Section 316(b) requirements in the final rule (40 CFR § 125.92(c)(1)). In particular, the CCC Project will use evaporative cooling towers, as described elsewhere in this chapter. While the final rule does not require either specific rates of reduction of water use relative to open-cycle cooling or a minimum number of cycles of concentration, it is useful to consider the rates of water use reduction relative to the previous open-cycle performance of CREC Units 1, 2, and 3. When considered on the basis of electricity output (i.e., megawatt), Units 1, 2, and 3 used, on average, approximately 1.03 million gallons per day per megawatt (MGD/MW). In contrast, the proposed CCC Project will use cooling tower makeup and flow augmentation with a combined seawater withdrawal of 0.07 MGD/MW (93-percent reduction relative to Units 1, 2, and 3).

Makeup water from the intake bays is expected to be pumped by three 50-percent capacity pumps and conveyed to the Project cooling towers through one pipe. Cooling tower blowdown will be conveyed to the discharge canal area through a pipeline, combined with the flow augmentation water, and conveyed through a pipe to the new discharge structure in the existing CREC discharge canal.

The two saltwater cooling towers will be operated at 1.3 cycles of concentration. Evaporative cooling in the towers will concentrate solutes contained in the intake water by a factor of 1.3 (i.e., increased by 30 percent) in the cooling tower blowdown. Chemicals used in the cooling water system will include intermittent biocide (sodium hypochlorite and/or sodium bromide), consistent with EPA effluent guidelines for the steam electric industry (40 CFR Part 423) and applicable state nonprocedural requirements (including for dechlorination with sodium bisulfite). With the exception of addition of an FDEP-approved surfactant to increase the effectiveness of the biocide treatments and as a silt dispersant, no other water treatment chemicals will be used in the cooling water system. As discussed in Section 4.5.1.3, the cooling tower blowdown will be mixed with additional water from the intake canal to ensure that the concentration of chloride is increased by no more than 10 percent above the source water concentration per Florida's water quality standards.

As presented herein, the proposed CCC Project's proposed withdrawal of cooling tower makeup and augmentation water is compliant under the new CWA Section 316(b) requirements applicable to new units at existing facilities, because it employs a closed-cycle recirculating cooling system. This closed-cycle recirculating cooling system will be "designed and properly operated using minimized makeup and blowdown flows" in accordance with the EPA rule. The proposed CCC Project cooling system will reduce use of cooling system makeup/augmentation water by 93 percent relative to the open-cycle cooling systems previously employed in Units 1, 2, and 3.

EPA's new CWA Section 316(b) rule provides that NPDES applications for new units at existing facilities must submit specified information. This requirement will be met in the context of the NPDES permit revision application for the CCC Project (see Appendix 10.2.2).

4.5.1.2 Sources of Cooling System Water Makeup

The quality of the water used to supply (or make up) the cooling towers is limited by two factors: (1) the need to avoid the formation of precipitates within the cooling tower that would adversely affect heat transfer, and (2) the constraints imposed by water quality-based effluent limits imposed under the NPDES permit. When water containing low levels of dissolved solids is readily available, it is possible that cooling towers can be run at ten (or more) cycles of concentration (i.e., 90 percent of the source water is evaporated and dissolved solutes are concentrated ten-fold). Such a supply is not available at the CCC Site and seawater will be used for cooling tower makeup. Use of seawater will require operation of the cooling towers at much lower cycles of concentration, as well as augmentation of the cooling tower blowdown to meet applicable water quality standards for chlorides.

For the CCC Project, the cooling towers will use seawater withdrawn from the head of the existing CREC intake canal at the former Crystal River Unit 3 cooling water intake structure. The closed-cycle cooling system will have an average design makeup water rate of 24,764 gpm (35.66 MGD) and a blowdown rate of 19,050 gpm (27.43 MGD), resulting in a use of 5,720 gpm (8.24 MGD) from evaporation and drift. The summertime maximum rate of cooling tower makeup will be 32,874 gpm (47.34 MGD) and blowdown rate of 25,300 gpm (36.43 MGD). The summertime use will be 7,596 gpm (10.94 MGD). As discussed previously in Section 4.5, the proposed Project cooling water withdrawal quantities, as well as discharge quantities, are significantly lower than historical cooling water flows when Crystal River Unit 3 was operational.

4.5.1.3 Flow Augmentation System

For the CCC Project, seawater will be added to the cooling tower blowdown in a conduit prior to discharge to achieve applicable Florida surface water quality standards regarding allowable increases in chlorides concentrations. Rule 62-302.530(17), F.A.C., provides:

In predominantly marine waters, [chlorides concentrations shall] not [be] increased more than 10% above normal back-ground. Normal daily and seasonal fluctuations shall be maintained.

Operation of the cooling towers at 1.3 cycles of concentration will result in a 30-percent increase in the concentration of chlorides in the blowdown relative to the source water. Seawater from the intake canal will be used to provide the augmenta-

tion water and will be pumped at approximately twice the rate of cooling tower blowdown, lowering the chlorides concentrations from 30 percent above the source water to a maximum 10-percent increase. Figures 4.5.0-1, 4.5.0-2, and 4.5.0-3 show the anticipated flow rates for the cooling tower makeup and augmentation water for different operating conditions. The typical (i.e., annual average) augmentation flow will be approximately 38,106 gpm (54.87 MGD) and the maximum anticipated rate will be approximately 50,616 gpm (72.89 MGD). Other effluent characteristics (e.g., increased temperature and existing constituents in the cooling tower makeup) will also be affected by the augmentation flow.

As with the cooling tower makeup water, the flow augmentation water will be pumped from existing intake bays previously used by Crystal River Unit 3. While the flow augmentation water will not be used directly for cooling, its withdrawal may be subject to impingement and entrainment mitigation measures similar to those that apply to cooling tower makeup. As such, the intake bays to supply flow augmentation water will also be retrofitted to comply with Section 316(b) requirements, designed to ensure that the intake velocity will be below 0.5 fps during low-water conditions and maximum head differential. As previously discussed, the cooling water system, including flow augmentation water, will be compliant with EPA's final rule for cooling water intake structures at new units of existing facilities under Section 316(b) of the CWA.

Flow augmentation water from the intake bays is expected to be pumped by three 50-percent capacity pumps and conveyed to the location for mixing with the cooling tower blowdown through a pipe. Following the confluence of the two streams, the combined blowdown/augmentation water stream will be conveyed to the new outfall structure by a pipe of approximately 1,100 ft in length, allowing for substantial mixing. The pipe will discharge to an outfall structure on the eastern end of the existing CREC discharge canal (see Figure 4.5.1-2). The new discharge outfall will consist of a concrete headwall, baffle, and overflow weir that discharges onto a concrete apron and riprap. Figure 4.5.1-3 provides plan and cross-section views of the new discharge structure.

Flow augmentation water will receive no chemical or physical treatment prior to mixing with cooling tower blowdown.

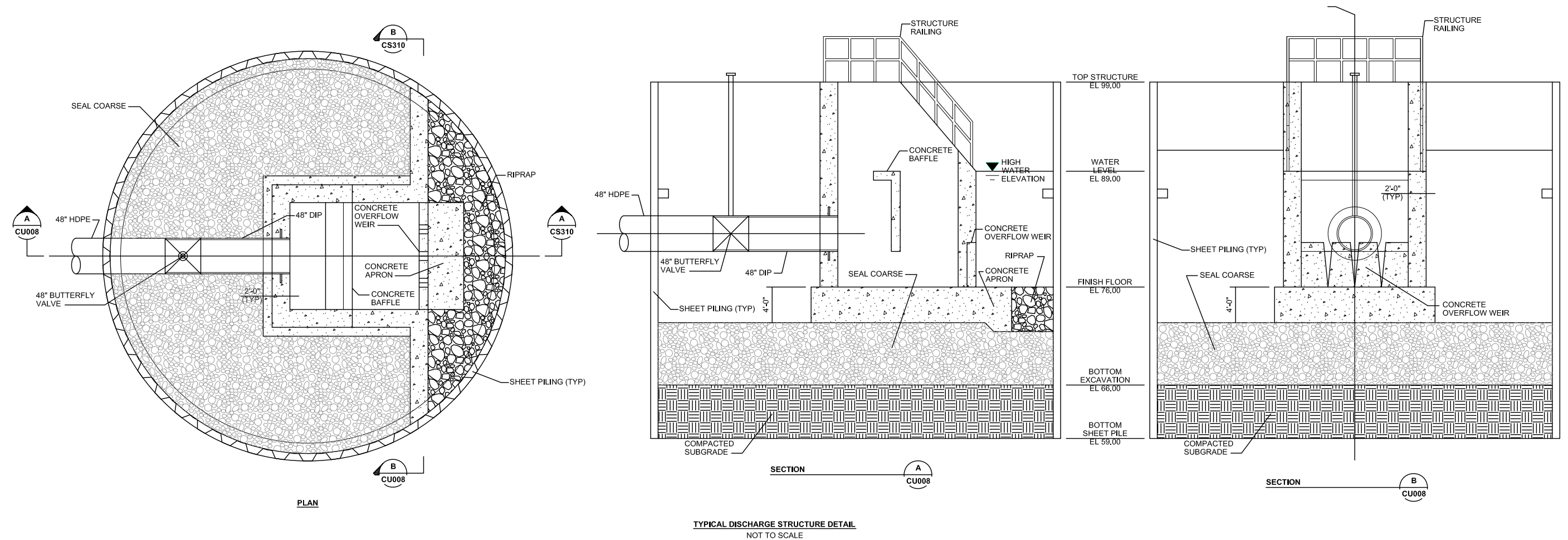


FIGURE 4.5.1-3.
CONCEPTUAL PLAN AND CROSS-SECTION VIEWS OF NEW DISCHARGE STRUCTURE

Sources: Burns & McDonnell, 2014; ECT, 2014.

4.5.1.4 Blowdown, Screened Organisms, and Trash Disposal

As discussed in Section 4.5.1.3, the cooling tower blowdown will be combined with seawater to achieve compliance with the chlorides standard and discharged through a new discharge structure in the CREC existing discharge canal. For the CCC Project, the new blowdown/augmentation water discharge will be permitted through a revision of the existing NPDES Permit No. FL0000159 for Crystal River Units 1, 2, and 3, which was last renewed on April 7, 2014 (see Appendix 10.6.3).

The temperature of the cooling tower blowdown water discharged to the discharge canal will be influenced by ambient seawater temperatures associated with the chlorides flow augmentation water, as well as the cooling tower blowdown temperature, as affected by facility heat load and ambient meteorological conditions. Table 4.5.1-1 presents estimates of annual average effluent temperature, as well as maximum anticipated effluent temperature based on these factors. The table uses the average seawater temperature observed in the intake water for the months of March, April, May, September, October, and November for the average annual temperature of the flow augmentation water. It uses an estimate of the cooling tower blowdown temperature during the same months. A flow-weighted average temperature of 77.3°F is presented as the average annual effluent temperature. The maximum anticipated temperature is based on modeling of cooling tower blowdown under extreme conditions (i.e., full facility load, ambient dry bulb temperature of 98.5°F, and ambient wet bulb temperature of 86.0°F), as well as the highest observed inlet water temperature (94.9°F).

Table 4.5.1-1. Projected Effluent Temperatures

Parameter	Average	Maximum
Inputs		
Intake canal temperature basis	Average	Maximum
Intake canal temperature (°F)	74.6	94.9
Cooling tower blowdown (°F)	82.8	96.6
Augmentation flow rate (gpm)	38,026	29,026
Cooling tower blowdown rate (gpm)	19,010	18,868
Estimate		
Effluent temperature to effluent canal (°F)	77.3	95.6

Sources: Burns & McDonnell, 2014.
ECT, 2014.

The resulting estimate of maximum effluent temperature is 95.6°F. It should be noted that the highest observed inlet temperature should be considered to be an extreme value. In fact, it is one of only two observations in 9 years of inlet record that exceed 92°F. If 92°F is used as a more representative maximum temperature and the same estimated maximum blowdown temperature is used, the predicted maximum effluent temperature is estimated to be 93.8°F. The cooling tower blowdown and mixed blowdown/flow augmentation water will be transported in subsurface pipes for several thousand feet prior to discharge. This will allow for heat transfer from the effluent to subsurface soils. Such heat dissipation is not accounted for in Table 4.5.1-1. For these reasons, the effluent temperatures in Table 4.5.1-1 are conservative.

Use of closed-cycle recirculating cooling by the proposed CCC Project will greatly reduce the thermal loading to the aquatic environment relative to open-cycle systems with similar heat rejection capacities. The system proposed for the CCC Project will be designed to meet the applicable water quality standards as defined in the facility's NPDES permit during normal operating and climatic conditions. Importantly, the conservatively estimated maximum effluent temperature of 95.6°F is below the NPDES permit limits for compliance with the Section 316(a) thermal variance (96.5°F for 3-hour average). Consistent with the monitoring in the existing CREC NPDES permit, DEF is proposing to continue measuring temperature under the NPDES permit near the end of the discharge canal (EFF-3D in the current NPDES permit).

In addition to a favorable comparison of effluent temperatures to limitations, the total thermal loading (e.g., British thermal units per hour [Btu/hr] or the product of the increase in temperature above ambient and the effluent flow rate) of the cooling water discharge is reduced substantially relative to open cycle cooling (between 96 and 99 percent, depending on operational scenarios). The thermal loading contributed by the CCC units adds only 0.78 percent compared to the thermal loading historically associated with Units 1, 2, and 3 (Table 4.5.1-2). This modest increase in thermal loading complies with the statutory requirements for expansion of an existing thermal source under Section 403.08852, F.S. Ultimately, considering the retirement of Crystal River Unit 3 and Crystal River Units 1 and 2 in conjunction with the operation of the CCC Project, thermal loading will be substantially reduced.

Table 4.5.1-2. CREC Unit Operations Effluent Thermal Loading

Unit	Generator Output* (MW electric)	Heat Rejection Rate (MW thermal)	Heat Load Added to Discharge Canal	
			Btu/hr	%
CREC 1	373.95	485.03	1.66E+09	16.80
CREC 2	520.82	674.06	2.30E+09	23.35
CREC 3	880.02	1,727.40	5.91E+09	59.84
Total CREC Units	1,774.79	2,886.49	9.87E+09	100.00
CCC 1	362	545.5	3.86E+07	0.39
CCC 2	362	545.5	3.86E+07	0.39
Total CCC	724	1,091.0	7.72E+07	0.78

*Generator output for CCC 1 and 2 are for steam cycle only.

Sources: DEF, 2014.
Burns & McDonnell, 2014.
ECT, 2014.

4.5.1.5 Injection Wells

No injection wells are proposed as part of the CCC Project.

4.5.2 Domestic/Sanitary Wastewater

The sanitary wastewater system will include discharges from bathrooms, showers, drinking fountains, and sinks. Sanitary wastewater will be generated by employees and visitors to the plant. Estimated wastewater generation will be approximately 1 gpm or 1,440 gpd (see Table 4.5.0-1). There are no regional wastewater treatment facilities in the area available to serve the Project. Sanitary wastewater will be disposed of on-Site through the use of an appropriately designed package treatment plant or a subsurface septic treatment system consisting of a 3,200-gallon septic tank and a 75-ft by 30-ft tile drainfield. The septic system or package treatment plant with land application will be located, designed, and constructed in accordance with all applicable nonprocedural requirements.

Additional needs for sanitary wastewater service during construction and during plant maintenance outages will be handled by portable chemical toilets.

4.5.3 Potable Water Systems

There are no regional potable water facilities in the area available to serve the Project. The facility will supply potable water for use by employees using treated groundwater withdrawn from existing CREC wells. As shown in the water balances, the typical potable water use is estimated to be approximately 1 gpm. The potable water system will supply pressurized potable water to safety showers, emergency eyewash stations, sanitary users in the administration building, and laboratory sinks throughout the plant.

The source of potable water will be treated well water from existing wells that currently serve Crystal River Units 1, 2, and 3. As discussed previously in Section 4.5, sufficient capacity exists under the existing water use permit for Units 1, 2, and 3 to supply the maximum process and potable demands for the CCC Project.

The raw well water will be routed through the potable water treatment system. This treatment will consist of the following:

- Two 100-percent potable water supply pumps.
- Two 100-percent primary filters.
- Two 100-percent carbon filters.
- Potable water storage tank with aqueous sodium hypochlorite (chlorine) injection.

Backwash from the primary filters will be routed to the percolation pond system through the plant drains system.

The proposed potable water system will be classified as a nontransient, noncommunity system, because it will regularly serve at least 25 of the same persons over 6 months per year. The potable water system will be designed, constructed, and operated in accordance with the applicable nonprocedural requirements, including Chapters 62-550, 62-555, 62-560, and 62-699, F.A.C., as applicable. The specific detailed design and specifications for the potable water system will be refined during the detailed engineering/design stage of the Project.

4.5.4 Process Water System

Plant process and service water will be supplied by groundwater from existing wells that currently serve Crystal River Units 1, 2, and 3. The availability of well water under an existing water use permit is discussed in Section 4.5. Water balances showing process and service water use rates under various operating conditions are shown in Figures 4.5.0-1 through 4.5.0-3.

4.5.4.1 Service Water Uses

The service water system will provide water to the general service wash down hoses throughout the plant and the plant fire protection system. Service water used as washdown water may contain oil and will be collected in the plant drains, treated using oil-water separators, and routed to the wastewater collection sumps for discharge to the percolation pond system.

4.5.4.2 Demineralized Water Uses

The major process water streams will be for the HRSG boiler feedwater systems. These streams will be treated by a demineralized water treatment system. This treatment will consist of the following:

- Reverse osmosis (RO) pretreatment system, including filtration and chemical feed for dechlorination.
- Antiscalant feed system.
- RO skid with two pass configuration.
- RO inlet bag filter.
- Cartridge filter.
- Caustic addition system for inter-stage pH adjustment for carbon dioxide (CO₂) removal.
- One clean-in-place tank.
- Neutralization tank for RO cleaning waste neutralization.
- Condensate polishing system.

The permeate from the second pass RO will be polished using two lines of 100-percent capacity regenerated mixed-bed vessels, which will be regenerated off-Site. Each line will consist of two service deionization (SDI) vessels arranged in a lead/lag configuration with the capability to place either vessel in the lead position by changing the

valve settings in the SDI pipe manifold. The SDI manifold will allow conductivity monitoring of each SDI vessel with sodium and silica analyzers located on the common effluent from the SDI manifold.

The demineralized water treatment system will utilize the following chemicals: aqueous ammonia or amines, antiscalant, sodium bisulfate, caustic, and corrosion inhibitors. Residual disposal from the treatment process will be routed to the percolation pond system through the plant drains system. Residual water from the treatment process will be routed through the plant drains system to the wastewater collection sumps for disposal in the percolation pond system.

4.5.4.3 Percolation Pond System

As shown in the water balances in Section 4.5, low-volume wastewaters generated during the CCC Project operations will be collected, routed through the plant drains system to the wastewater collection sump, and discharged to the on-Site percolation pond system for disposal. These IWWs include but are not limited to HRSG blowdown, filter backwash from the potable and service water treatment systems, residual water from the demineralized water treatment system, condensate polisher regeneration waste, and equipment wash waters. The wastewater from floor and equipment drains throughout the plant will be collected and treated through oil/water separators prior to being routed to the wastewater collection sump.

The percolation IWW disposal pond system will be designed in accordance with all applicable nonprocedural requirements. The pond will be designed to handle a wastewater influent flow of approximately 148 gpm (213,120 gpd) plus the flows from a 25-year, 24-hour rainfall event of 8.7 inches, assuming a soil infiltration rate of 2 inches per hour. The top of the pond will be approximately 158 ft in length and approximately 98 ft in width, covering approximately 15,484 square feet (ft²). The pond will be surrounded by four-to-one sloped berms approximately 6 to 7 ft above the existing grade. The pond will also be designed to allow for approximately 12 inches of sedimentation storage in the basin bottom and with approximately 3 ft of freeboard above the water surface. The pond will not have surface water discharges. Figure 4.5.4-1 provides a conceptual cross-section of the percolation pond.

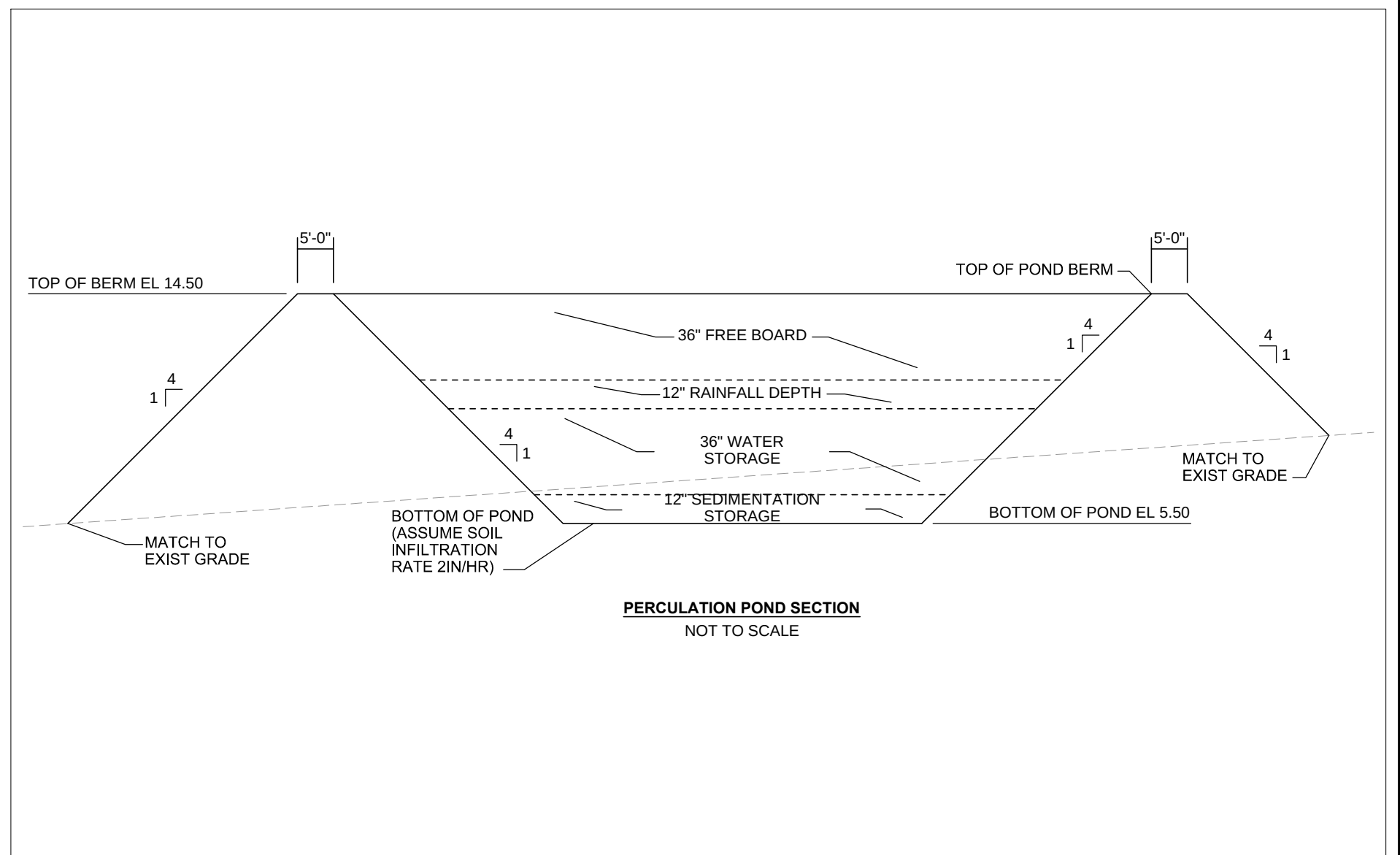


FIGURE 4.5.4-1.
CONCEPTUAL CROSS-SECTION OF PERCOLATION POND

Sources: Burns & McDonnell, 2014; ECT, 2014.



During operations, DEF will implement a groundwater monitoring program pursuant to a revised Sitewide groundwater monitoring plan reviewed and approved by FDEP.

4.6 Chemical and Biocide Waste

The following section describes the wastewater streams that will exist at the proposed CCC Project. This includes their origin, the nature of any treatment chemicals, and their means of conveyance, treatment, and disposal.

4.6.1 Water, Wastewater, and Waste Steams

As described in the facility water balances (Figures 4.5.0-1 through 4.5.0-3), CCC will generate wastewaters from four plant-related systems:

- Cooling tower blowdown.
- Wastewater discharged from the HRSG as well as the wastewater generated in the pretreatment of HRSG makeup water.
- Used service water.
- Sanitary wastewater.

In addition, stormwater runoff will be generated from the plant (see Sections 4.6.2 and 4.8).

Cooling tower blowdown will be discharged to the existing CREC discharge canal under the revised NPDES permit. The plant drains system will collect service wastewater from containment areas, floor drains, and equipment drains throughout the plant. This collected wastewater will then gravity-drain through oil/water separators into the separator's collection chamber and then will be forwarded to the wastewater collection sump. The discharge of the wastewater collection sump will be routed to the percolation pond.

4.6.1.1 Condenser Cooling Water

CCC will use closed-cycle condenser cooling, meaning that condenser cooling water will be cycled through evaporative cooling towers to condense steam from the STG process (see Section 4.6.1.2).

4.6.1.2 Cooling Tower Blowdown

Blowdown from the cooling towers will be discharged to the eastern end of the existing discharge canal. Limited, intermittent biocide treatment using a combination of sodium hypochlorite and sodium bromine, as authorized by the revised NPDES permit FL0000159, will be used for CCC to prevent biofouling of the cooling towers. A surfactant may also be used during biocide treatment. During intermittent chlorination, cooling tower blowdown will be dechlorinated and subject to monitoring for total residual oxidants according to the requirements of the NPDES discharge permit. Table 4.6.1-1 presents the chemicals to be used to treat seawater used for cooling, as well as to treat blowdown. The table specifies the chemicals projected to be used, their anticipated average and maximum daily rates of use, and their means and quantity of storage. Cooling tower blowdown will be mixed with flow augmentation water (untreated seawater) prior to discharge to ensure that the concentration of chlorides is not increased by more than 10 percent relative to source water (see Section 4.5.1.3).

Table 4.6.1-1. Projected Treatment Chemical Use in the Cooling Towers

Chemical	Daily Use (gallons)		Storage Container Size and Type (Combined facility)
	Average	Maximum	
Sodium hypochlorite (12.5 percent)			
Intake feed	2,174	2,415	7,000-gallon poly tank
Cooling tower feed	444	444	7,000-gallon poly tank
Sodium bromide (42.8 percent)			
Intake feed	157	245	7,000-gallon poly tank
Cooling tower feed	32	45	7,000-gallon poly tank
Surfactant	7.1	9.5	7,000-gallon poly tank
Sodium bisulfite	Variable*	Variable*	3,000-gallon poly tank

*Dosage rate will vary with oxidant demand in source water and flow rate.

Sources: DEF, 2014.
ECT, 2014.

4.6.1.3 Low-Volume Wastes

In its June 7, 2013, proposed rule for revised Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (78 FR 34432 through 34543), EPA proposed the following revised definition for low volume wastewaters (78 FR 34532):

Wastewater from all sources including, but not limited to: ion exchange water treatment systems, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes, and recirculating house service water systems. Sanitary and air conditioning wastes and carbon capture wastewater are not included.

Low-volume wastes at CCC will consist of blowdown from the HRSG, discharges from house service water systems and floor drains, and waste streams associated with raw water treatment (see Figures 4.5.0-1 through 4.5.0-3 for flow rates under different operating conditions).

The HRSG water will be chemically treated to prevent corrosion or scaling of the equipment. The condensate/feedwater will be treated with the following materials to achieve different specific goals:

- Aqueous ammonia (or an amine) to control condensate/feedwater pH.
- Sodium phosphate to control boiler water pH as well as hardness, which can cause scaling.

Miscellaneous closed-loop recirculating water heat exchanger systems may also employ nitrite-based corrosion inhibitors.

Table 4.6.1-2 defines the anticipated process water treatment chemicals, their average and maximum rates of use, and their means of storage.

Service water used at the facility (e.g., wash down water) may contact oil, and all floor drains will be routed through an oil/water separator. All low-volume wastes will be routed to the percolation pond.

Table 4.6.1-2. Projected Treatment Chemical Use in the Low-Volume Streams

Chemical	Daily Use (gallons)		Storage Container Size and Type (For each unit)
	Average	Maximum	
Condensate and boiler water			
Aqueous ammonia (19 percent)	3.6	6	330-gallon stainless steel tank
Sodium phosphate	1	1	330-gallon stainless steel tank
Closed-loop systems			
Nitrite-based corrosion inhibitor	0.5	0.5	330-gallon stainless steel tank

Sources: DEF, 2014.
ECT, 2014.

4.6.1.4 Metal Cleaning Wastes

The HRSG and feedwater piping will be chemically cleaned initially during commissioning and also periodically during the life of CCC. The chemicals used will not be permanently stored on-Site but will be delivered to the Site by a licensed contractor at the time of the scheduled periodic cleanings. The chemical cleaning solutions to be used for acid and alkaline cleaning of the HRSG must be consistent with the HRSG manufacturer's recommendations. Chemicals typically used in HRSG and feedwater pipe cleaning may include the following:

- Inhibited citric acid.
- Aqueous ammonia.
- Organic chelates, such as ethylene diamine tetra-acetic acid.
- Disodium phosphate.
- Trisodium phosphate.
- Nonfoaming wetting agents.
- Foam inhibitors.

In addition, periodic CTG washes may occur using a blend of nonionic surfactants, corrosion inhibitors, organic solvents, and demineralized water. Metal cleaning wastewaters will consist of the cleaning solutions and material removed during the cleaning process. Wastewaters generated by these activities will be collected and disposed off-Site in accordance with applicable requirements.

4.6.2 Process Wastewater and Stormwater Runoff Treatment System

The following sections describe the wastewater collection systems as well as the wastewater treatment systems.

4.6.2.1 Wastewater Collection

Wastewater from the demineralization system, as well as blowdown from the HRSG, will be routed to the wastewater collection sump and then to the percolation pond. The plant drains system will collect wastewater from containment areas, floor drains, and equipment drains throughout the plant. This collected wastewater will then gravity-drain through oil/water separators into the separator's collection chamber and then will be forwarded to the wastewater collection sump. The discharge of the wastewater collection sump will be routed to the percolation pond. Section 4.8 discusses facility stormwater management during both construction and operation.

4.6.2.2 Wastewater Treatment

Service wastewater and facility floor drains will be subject to oil/water separation prior to discharge to the percolation ponds. Low-volume wastes (e.g., HRSG blowdown) will not receive wastewater treatment prior to discharge to the percolation pond.

Cooling tower blowdown will be subject to 40 CFR 423 effluent limits for total residual oxidants and will be dechlorinated and monitored during intermittent chlorination events. Sanitary wastewaters will be treated in a subsurface disposal system.

Contract stormwater runoff associated with industrial activity will be subject to oil/water separation prior to discharge to the percolation pond. Noncontact stormwater runoff will be collected and routed to stormwater detention ponds for quantity and quality treatment.

4.7 Solid and Hazardous Wastes

Nonhazardous and potentially hazardous wastes associated with the operation of the proposed CCC Project will be managed in accordance with applicable federal, state, and local regulations. The Project CTGs will be fired on clean natural gas, which does not produce substantial amounts of solid wastes. Also, the Project operations will not require any on-Site solid waste management units/disposal areas. Solid waste, with the potential exception of material collected from the CCC cooling tower basins, will be disposed at a licensed solid waste facility (the existing Citrus County landfill),

which has sufficient capacity to accept the relatively small amount of solid waste expected to be generated.

4.7.1 Solid Wastes

During the CCC Project operations, small quantities of nonhazardous solid wastes will be periodically generated. These wastes will generally include water treatment solids, used air inlet filters, grease, used oil, used oil filters, and maintenance-related waste materials, and general plant and office refuse. Used oil and spent lubricating oil will be collected and transported off-Site by a licensed contractor for recycling or disposal. Other maintenance-related wastes, such as rags, scrap wood and steel, machine parts, electrical materials, or empty containers and packaging, will be collected, segregated in disposal containers, and transported off-Site by a licensed waste hauler for recycling or disposal. Material removed from the Crystal River Units 4 and 5 cooling tower basins is allowed to be disposed at the existing CREC ash storage area. It is anticipated that material collected from the CCC cooling tower basins will also be directed to this area. No other solid wastes will be disposed on the Site. All other solid waste will be disposed at a licensed solid waste management facility (the existing Citrus County landfill) that has sufficient capacity to accept the relatively small amount of solid waste expected to be generated.

4.7.2 Hazardous Wastes

The proposed CCC Project may occasionally generate small quantities (i.e., less than 100 kilograms per month of potentially hazardous wastes during operations and maintenance activities), which results in a conditionally exempt small-quantity generator status. The facility will have a site-specific EPA hazardous waste identification number. These wastes generally may include laboratory chemicals, solvents, cleaning fluids, and paints. To the extent practicable, DEF will attempt to select materials that produce only nonhazardous wastes. The potentially hazardous wastes will be collected, managed, and temporarily stored in a designated hazardous waste storage area and periodically transported from the Site by a licensed hazardous waste hauler for disposal at an appropriately permitted facility. Batteries, bulbs (lamps), and mercury-containing devices will be managed as universal wastes as appropriate. Hazardous waste will be managed, reported, and documented in accordance with applicable re-

quirements. No hazardous waste will be disposed of in Citrus County's solid waste disposal facility.

4.8 On-Site Drainage System

The proposed Project will provide an on-Site stormwater management system in accordance with all applicable nonprocedural requirements, including Part IV of Chapter 373, F.S., and Chapter 62-330, F.A.C. The system will contain several stormwater ponds that serve different parts of the CCC Project. Each of the stormwater ponds will be designed to meet the state and local rules and regulations for stormwater management systems. For stormwater attenuation and treatment during construction, two wet detention ponds will be constructed for the construction laydown area. In addition, the stormwater management system includes two dry and three wet detention ponds to manage stormwater during both the construction and operation phases of the CCC Project. Appendix 10.4 of this SCA contains a copy of the stormwater management plan.

As depicted in Figure 4.8.0-1, the proposed CCC Site consists of five primary drainage subbasins. Starting on the north side of the plant is the construction laydown area that will drain to the construction stormwater treatment pond Nos. 1 and 2. The power block, including the cooling towers, will drain to stormwater treatment pond Nos. 1 and 2. To the southeast of the power block is the gas yard area. Stormwater detention pond No. 5 will receive runoff from the gas yard area. A majority of the switchyard will drain to stormwater detention pond No. 4. The construction parking area will drain to stormwater detention pond No. 5. No portion of the stormwater management system will be located over or adjacent to an existing sinkhole.

The primary purposes of the treatment ponds are for quantity and quality treatment of stormwater runoff. The construction stormwater treatment ponds will be wet detention ponds but will only be used temporarily during the extent of construction. Stormwater detention pond Nos. 1 and 2 will be dry detention ponds because of restrictions in the site grading, while stormwater detention pond Nos. 3, 4, and 5 will be wet detention ponds.

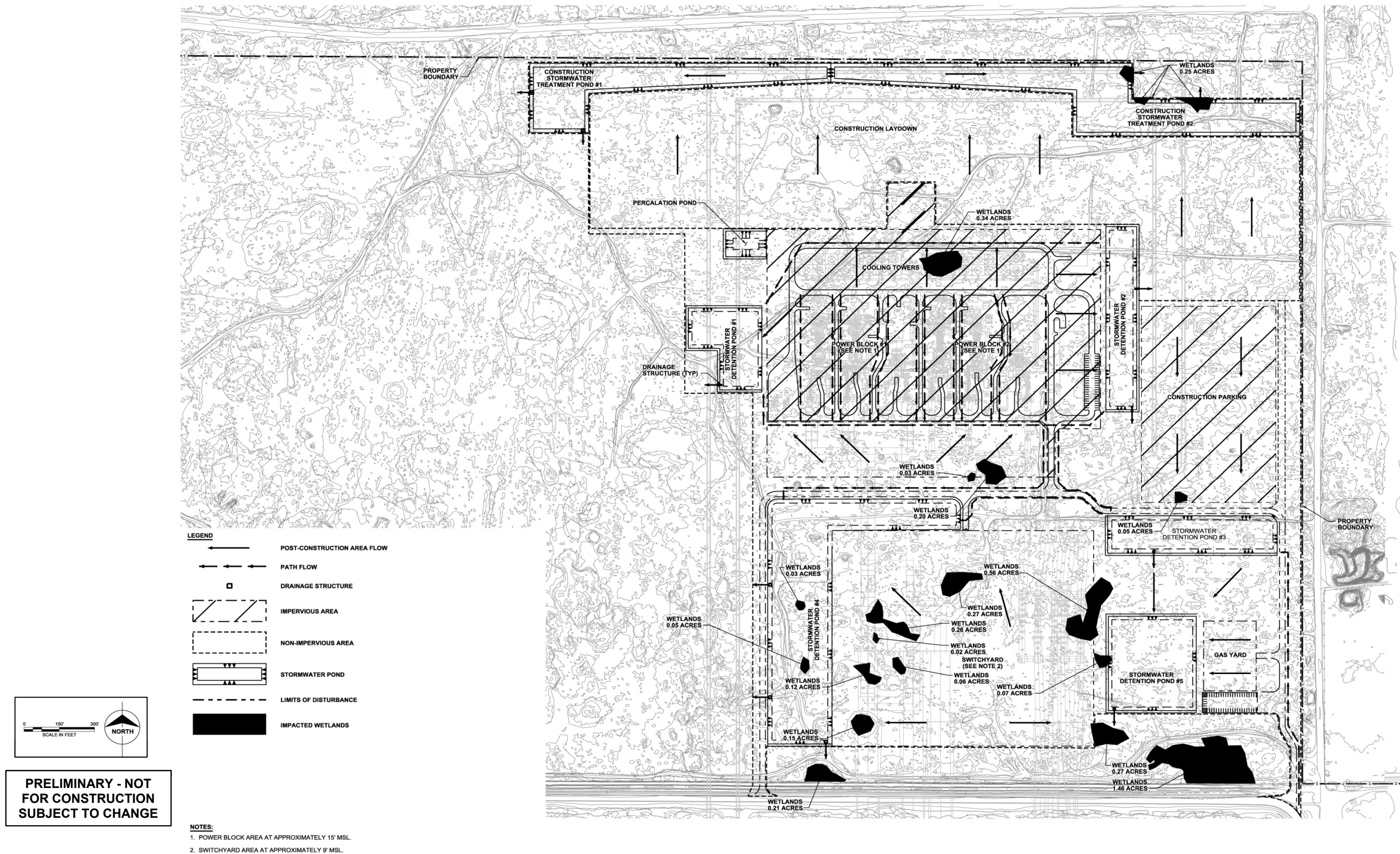


FIGURE 4.8.0-1.

STORMWATER MANAGEMENT PLAN

Sources: Burns & McDonnell, 2014. ECT, 2014.

The bottoms of the dry detention ponds will be sloped from the inlet to the discharge structure. The bottoms of the wet detention ponds will be flat, as they are designed to hold permanent standing water. The ponds will be constructed out of native soil material with suitable geotechnical properties. The interior side slopes of all ponds will be covered in vegetative material.

The outlet structures of the ponds will consist of open-top concrete drop-inlet structures with weirs for the inflow and pipes to convey the discharge water. The outlet structure for each pond will be located on the side of pond opposite of the inlet to allow for the maximum possible detention/solids settling time.

For dry ponds, a bleed-down pipe on the bottom of the pond will be connected to the concrete box to allow the detention of the first inch of the stormwater runoff event. The weir will be a rectangular weir. The purpose of the weir is to convey flow after the first inch. The top of the concrete box will be set to an elevation for emergency overflow situations.

The outlet structure of the wet detention ponds will be similar to that of the dry detention ponds, except the weir is a v-notched weir.

The proposed system does not alter contributing areas or watershed boundaries. Operation of the system results in no reduction of floodway conveyance within the Project area.

A hydrologic model (USACE's Hydrologic Engineering Center Hydrologic Modeling System [HEC-HMS]) was used to simulate stormwater runoff and routing for both the pre- and postconstruction conditions during a 25-year, 24-hour design storm. According to the results of the HEC-HMS model, the total postconstruction stormwater discharge will be less than the preconstruction runoff. Therefore, the proposed project will not have adverse hydrologic impacts.

4.9 Heavy Equipment and Materials

4.9.1 Construction Equipment and Materials Handling

The major components of the CCC Project that will be transported to and erected on the Site include:

- CTGs.
- HRSGs.
- STGs.
- Auxiliary boiler.
- Administrative/warehouse building.
- Cooling towers.
- HRSG stacks.
- Air quality control systems.
- Transformers.

Construction equipment and materials will be delivered to the Site by trucks using the existing roadway system, similar to previous construction activities for the existing CREC units. The trucks will travel to the Site area on U.S. 19, turn west on West Power Line Street, and then north on CREC's North Access Road to the Site. Certain heavy equipment may also be transported to the Site area using the existing railroad line running to CREC along the south side of West Power Line Street. These roads and rail have been used for delivery of heavy equipment for other construction activities at CREC and are adequate to support the deliveries.

Once on the Site, the equipment and construction materials will be unloaded for immediate erection or placed in the designated construction laydown area using portable cranes and trucks. As shown in Figure 4.2.0-2, the approximately 54-acre construction laydown area will be located north of the proposed Project cooling tower and power block areas. The construction laydown area, as well as the construction parking area, will be cleared, graded, and, as needed, filled early in the initial construction activities. The areas will also be covered with limestone, crushed rock, or other cover materials to stabilize the area and provide suitable work areas for construction trailers and prefabrication, preassembly, welding, painting, and other activities necessary for the preparation of the equipment. Temporary fencing will be installed around the construction laydown and parking areas to limit access.

As discussed in Section 4.8, appropriate stormwater runoff management systems will be provided to control potential sediment erosion impacts. Also, as needed, a water wagon will be used to control fugitive dust in the laydown and parking areas.

Construction of the Project will require a large volume of fill material to raise the area for the power blocks, cooling towers, generator step-up transformers, and administration/warehouse. This area will be raised approximately 8 to 9 ft for flood protection purposes. Clean fill materials with appropriate geotechnical properties will be obtained from sources in the region and delivered to the Site by trucks. The materials will be placed in the fill area, graded, and compacted. Appropriate stormwater management systems will be installed to control sediment erosion impacts.

4.9.2 Operations Material Handling

Materials to support the operations of the proposed CCC Project will be transported to the Site by trucks using the existing roadways. Routine materials for the operations typically include receiving and storing of the following:

- Water treatment chemicals.
- Aqueous ammonia.
- Process gases.
- Mercaptan.
- Lubricating oils.
- Hydraulic fluids.

The transport, handling, and storage facilities for these materials will include appropriate pollution control measures.

4.10 Associated Linear Facilities

The proposed CCC Project will include several directly associated linear facilities on the Site and extending off-Site. The off-Site portions of all of these linear facilities will remain within DEF's existing CREC property. The associated linear facilities for which DEF is seeking certification include:

- Three 500-kV and four 230-kV transmission lines.
- Cooling water makeup and blowdown pipelines.
- Augmentation water pipeline.
- Well water supply pipeline.
- Primary and secondary access roads, including potential Site access point along the eastern Site boundary to the existing off-Site roadway.
- On-Site portion of the natural gas supply pipeline from the gas yard to the power blocks.

As discussed previously, the natural gas pipeline lateral from the Sabal Trail gas transmission system running to the on-Site gas yard (i.e., metering/regulating station) and the gas yard itself will not be a certified facility. Sabal Trail will be responsible for permitting, owning, and operating the natural gas pipeline lateral and gas yard.

4.10.1 Transmission Lines

As shown on Figure 4.2.0-1, the on-Site portions of the three 500-kV and two of the 230-kV transmission lines will run south from the switchyard to the off-Site corridor. The two other 230-kV transmission lines will run north from the switchyard, turn west along the northern Site boundary, and then south to the off-Site corridor.

As shown in Figure 4.2.0-1, the off-Site portions of the new 230- and 500-kV transmission lines will be located within an approximately 1,200-ft-wide and approximately 7,200-ft-long corridor located to the south and southeast of the Site. The proposed corridor includes the portion of the DEF-owned existing transmission/road corridor to CREC between the southern Project Site boundary and the north side of the West Power Line Street right-of-way. The corridor does not include West Power Line Street, the rail line south of the street, or the mariculture center, which are also on DEF-owned property. The corridor runs from approximately 2,100 ft east of the eastern Site boundary to just east of the western Site boundary.

The proposed new 230- and 500-kV transmission lines will interconnect with DEF's existing transmission lines within the corridor. Chapter 9.0 provides more details on these associated transmission lines and corridor.

4.10.2 Water Pipelines

As shown in Figure 4.2.0-1, the on-Site portions of the cooling water makeup and blowdown and well water pipelines will run south from the western side of the power block area to the off-Site corridor. The off-Site portions of the cooling water makeup and blowdown water pipelines will initially be located within the same corridor as the transmission lines when they run south from the Site and west toward the CREC facilities. After the cooling water makeup and blowdown pipelines leave the transmission line corridor, these pipelines, as well as the augmentation water pipeline, will be located within a corridor of variable width up to 1,240 ft.

Also as shown in Figure 4.2.0-1, off-Site portion of the well water pipeline will run south from the Site, then to the east and south again, totally within the transmission line and pipeline corridor.

Chapter 9.0 of this SCA provides more detailed information on the water pipelines and the corridor.

4.10.3 Access Roads

Access to the Site will be via the existing CREC North Access Road along the southern Site boundary. The two access roads will run north on the Site to the plant facility area (see Figure 4.2.0-1). In addition, if DEF is able to obtain the necessary permission from the underlying property owners, DEF may use an existing road running parallel to the eastern boundary of the Site for Site access during Project construction and operation rather than the Site access point in the southeastern corner of the Site identified in Figure 4.2.0-2. That existing off-Site access road is not owned by DEF and, should DEF be able to obtain the necessary permission to use the roadway, will not be exclusively used by DEF. Therefore, pursuant to Section 403.503(14), F.S., DEF is not proposing certification of that roadway as an associated facility under this certification. Permits needed, if any, for improvements to that currently unpaved roadway will be separately obtained outside this certification. DEF is, however, seeking authorization under this certification to access the Site from that existing roadway as a potential alternative to the Site access point off the North Access Road in the southeastern corner of the Site. Chapter 3.0 of this SCA includes descriptions of the on-Site areas where the roads will be located. The design and construction of the access roads will comply with all applicable nonprocedural requirements, including Citrus County requirements. The access roads will be separated by more than 245 ft. On-Site parking and loading will be provided in accordance with the Citrus County LDC.

4.10.4 Natural Gas Pipeline

DEF is seeking certification of the on-Site portion of the natural gas pipeline running from the on-Site gas yard to the power block areas. This pipeline will be totally located on-Site. Chapter 3.0 of this SCA includes descriptions of the on-Site area for the pipeline.

4.11 Emergency Disaster Preparedness Plans

DEF fully recognizes the importance of emergency preparedness and response programs focused on providing rapid, effective protection of human health and the environment during emergency situations or events. To meet its commitment to such programs and in accordance with applicable federal, state, and local requirements, DEF has prepared and implemented a comprehensive emergency management guide (EMG) for its existing CREC and other power plants and facilities. The EMG consolidates into a single, functional plan the command and control structure, procedures, actions, and reporting in the event of an extreme emergency situation or event, such as fires, bomb threats, chemical/biological attack, terrorist activities, radiological contamination, sabotage, or severe natural disaster (i.e., hurricanes, etc.).

In addition, in compliance with applicable federal and state contingency planning requirements, DEF has prepared and implemented specific emergency response plans for events such as hazardous waste and/or chemical spills and releases and fires. All of DEF's emergency plans are controlled documents that are periodically reviewed and updated. Also, a key element of these plans is the training of key response team and plant personnel.

Based on its plans for existing facilities, DEF will prepare and implement appropriate emergency preparedness and response plans for the proposed CCC Project.