9.0 ELECTRICAL TRANSMISSION LINES AND OTHER ASSOCIATED LINEAR FACILITIES

This chapter describes the linear facilities that will extend off the GREC Site. GREC will require a short, 138-kV electric transmission line, as well as other short associated linear facilities as described in the following paragraphs:

- 138-kV Transmission Line—The power generated from the biomass facility will be routed within the GREC Site over a new overhead transmission line for approximately 4,100 ft alongside the main access road to a new interconnection switchyard located just outside the GREC Site on GRU's DGS property. The new transmission line will be constructed, owned, and operated by GREC LLC. The new interconnection switchyard will be built by GREC LLC but owned and maintained by GRU. From this new switchyard, two new GRU-owned and maintained 138-kV transmission lines will be constructed by GREC LLC to connect to GRU's existing looped 138-kV transmission line approximately 300 ft away, still remaining within the GRU DGS certified site. However, since these short transmission line portions and the interconnection switchyard will be located outside the GREC Site boundaries, they are addressed in this chapter.
- Natural Gas Pipeline—Natural gas will be used primarily for startup of GREC. To provide natural gas, a new, approximately 4,500-ft pipeline will be constructed by GREC from GRU's existing natural gas intake station located adjacent to the GRU DGS facilities to the GREC Site. This pipeline will be located within the DGS certified site. The GREC onsite portion of this pipeline will only be 430 ft, but the entire pipeline will eventually be owned and maintained by GRU.
- Sanitary Sewer Pipeline—GREC will construct a dedicated lift station at the southeast quadrant of the biomass power plant facilities to collect and discharge sanitary waste streams via an approximately 4,900-ft force main

pipeline across the GRU DGS certified site to GRU's existing sewer force main situated adjacent to the existing DGS facilities. Initial investigations conclude that there is existing capacity available to accommodate GREC waste streams, although alterations to the actual tie-in point may be needed. GREC LLC will license and build, but GRU will eventually own and operate the sanitary sewer pipeline.

- Access Roads—GREC will construct a new permanent main access road at the existing DGS construction access road entrance on U.S. 441. The existing GRU entrance at the southern end of the GREC Site will be improved by GREC LLC within the U.S. 441 right-of-way per FDOT requirements and will run a short distance across the existing CSX railroad line corridor, as well as across the DGS site property. Additionally GREC will make improvements to an existing DGS maintenance road on the DGS property to be used as a temporary GREC construction access road.

Figures 9.0.0-1 (street map) and 9.0.0-2 (aerial photograph) depict the corridors proposed for certification in this application.

Figure 9.0.0-1 shows in purple the 138-kV transmission line and switchyard corridor. This combined corridor is of variable width but generally less than 4,800 ft long and 500 ft wide (4,100 ft and 100 ft, respectively, for the transmission portion). While a portion is outside the GREC Site boundaries, it is still within the GRU DGS certified site boundaries. The 138-kV transmission line (offsite portion) and the 138-kV switchyard will be located within this corridor. These will all be certified as part of this application.

The multipipeline corridor, shown in gold on Figure 9.0.0-1, will be used for the natural gas pipeline and sanitary sewer pipeline connections to GRU DGS's facilities. These will all be located in a single corridor of approximately 14 ft in width and roughly 4,500 ft long. This multipipeline corridor is also completely contained within the certified GRU DGS property but offsite from the GREC Site.

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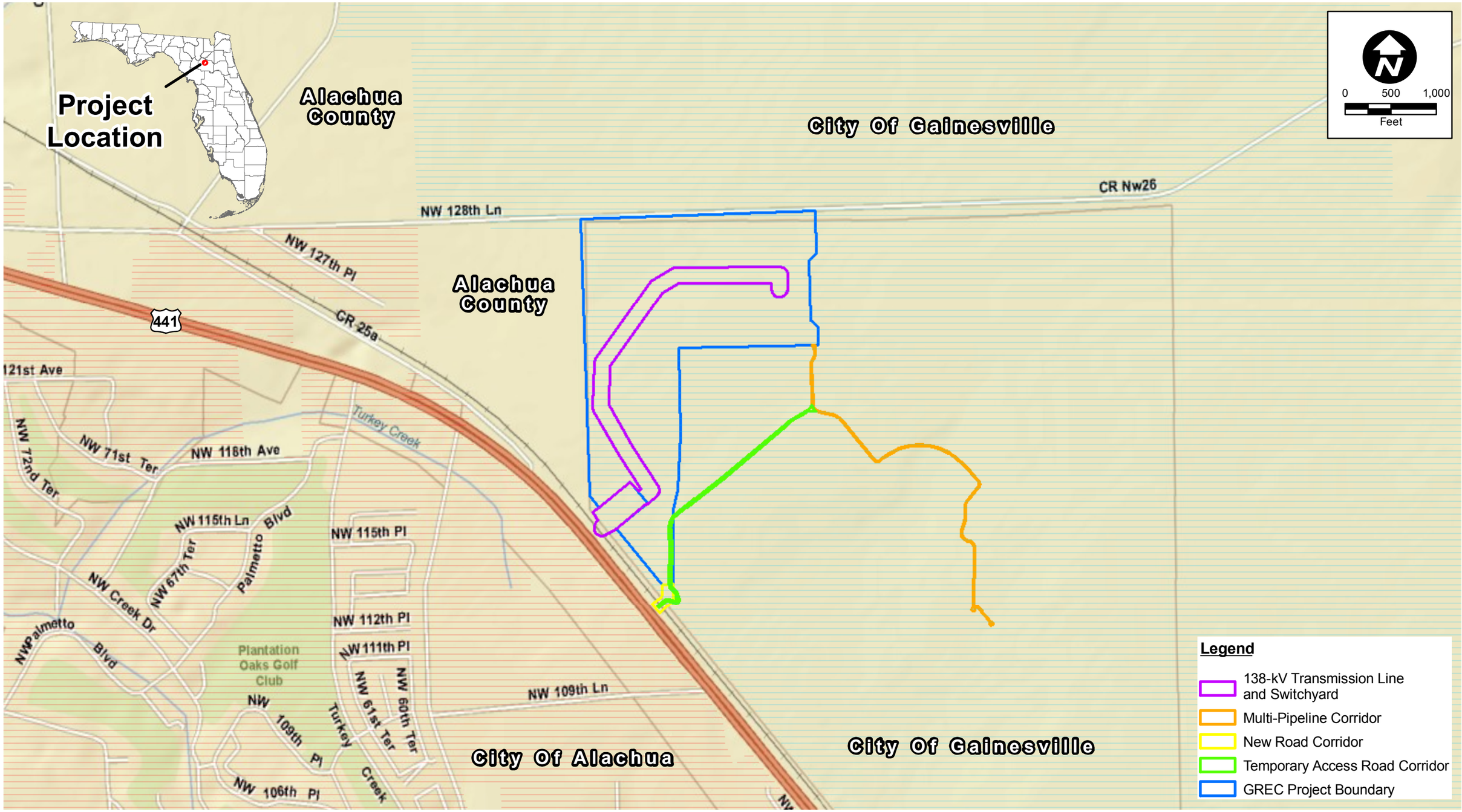

FIGURE 9.0.0-1.

LINEAR FACILITIES PROPOSED FOR CERTIFICATION

Source: ESRI Resource Center, 2009; Genesis, 2009; ECT, 2009.

Gainesville Renewable Energy Center
An American Renewables Company

File: M:\acad\090408\SCA_aerial.mxd

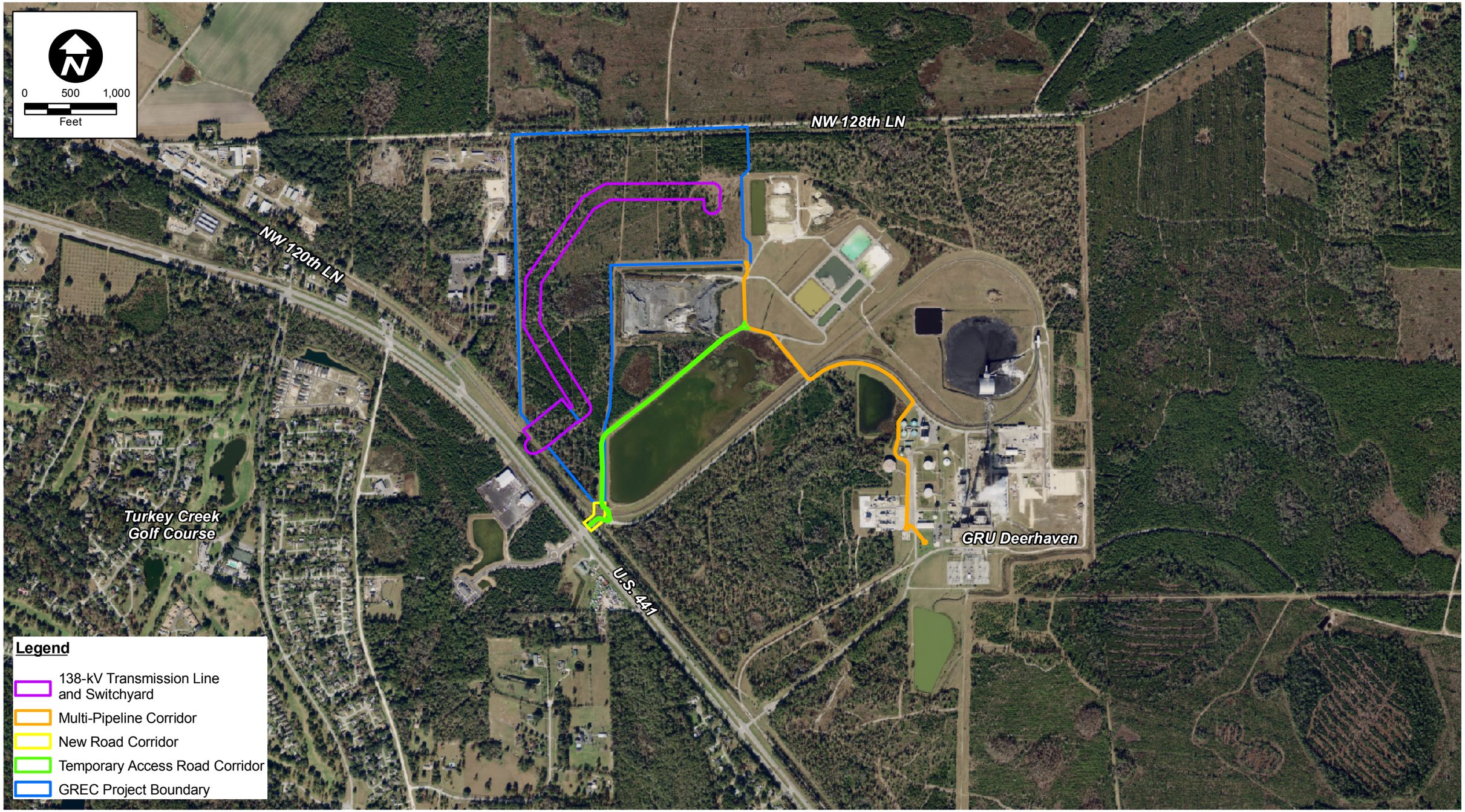

FIGURE 9.0.0-2.

AERIAL PHOTOGRAPH-LINEAR FACILITIES PROPOSED FOR CERTIFICATION

Source: FDOT, 2008; Genesis, 2009; ECT, 2009.

Gainesville Renewable Energy Center
An American Renewables Company

The new site access road corridor is shown in yellow on Figure 9.0.0-1 and will connect the southern end of the GREC Site boundary to U.S. 441. This short corridor contains the existing GRU construction entrance off U.S. 441 but will be widened and improved for GREC. The corridor is approximately 100 ft wide by 300 ft long.

Figure 9.0.0-1 shows in green the temporary construction access road corridor. This corridor will be up to approximately 24 ft wide and 3,000 ft long and will serve to provide GREC with temporary construction access to the proposed construction laydown areas described in Section 4.2. This road will use an existing GRU maintenance road but will be improved for use to sustain the increase in frequency by heavy equipment vehicles during the construction phase of the project. The entire length of this temporary road will be on the existing DGS certified site.

9.1 MAPS

The maps required per FDEP's application instruction guide for these short linear facilities will be found in the text as they are referenced rather than in this section. All maps are at a scale better than that recommended by FDEP, and all fit on a single map sheet, making reference to these facilities easier.

9.2 PROJECT DESCRIPTION

The facilities have been generally described in the first few paragraphs of this Chapter 9.0. As requested in the FDEP guide, the design parameters for each are generally discussed in the following and are shown in the referenced figures.

9.2.1 138-KV TRANSMISSION LINE

The onsite GREC 138-kV transmission line will connect to GRU's electrical system via a new switchyard and two short transmission lines located within the DGS certified site boundaries just outside the GREC Site. The onsite GREC transmission line will be a single-circuit, vertically framed line to be constructed on tubular steel poles. Average height of the poles will be 80 ft. Poles will be mounted onto concrete-filled caissons embedded in the ground at various depths depending on site-specific conditions. Figure 9.2.1-1 provides a typical structure diagram.

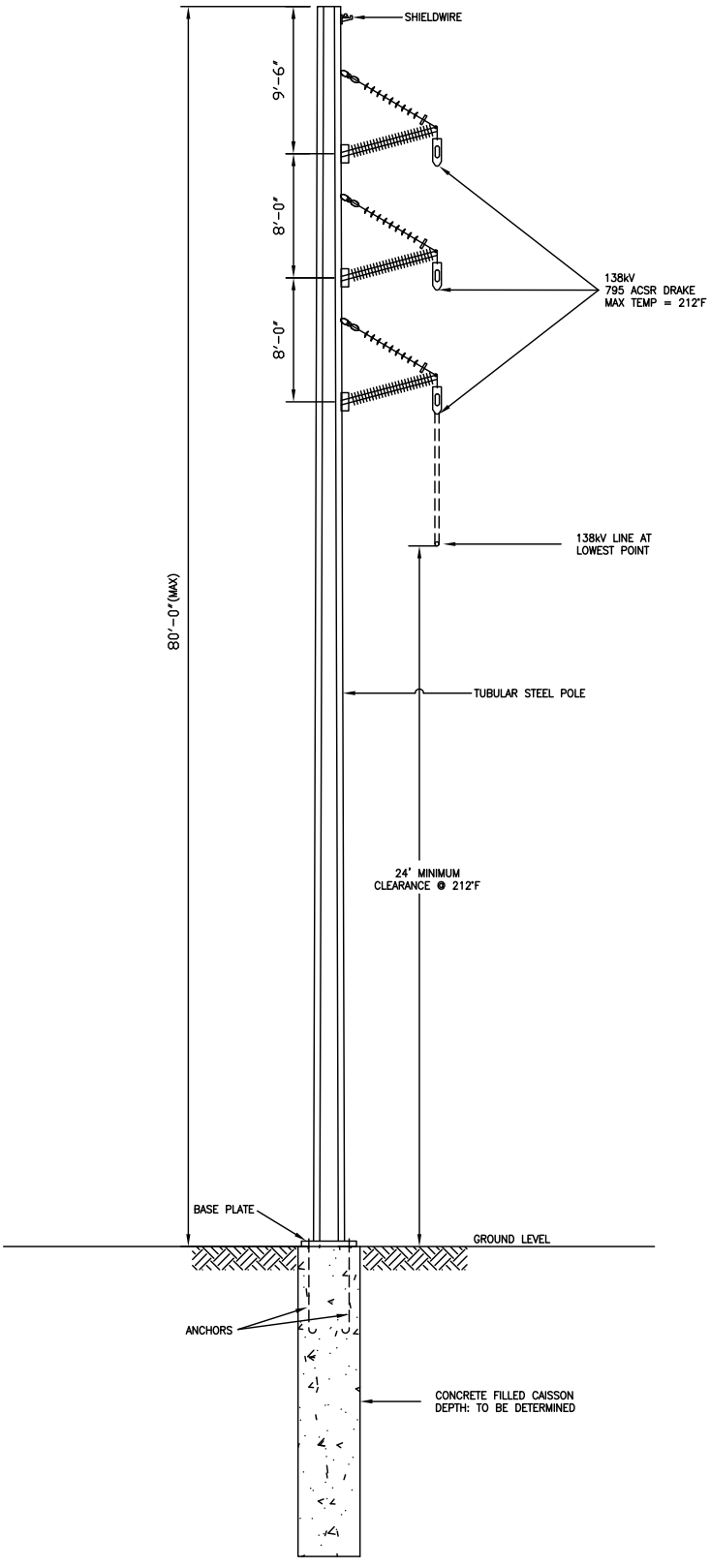

FIGURE 9.2.1-1.

TYPICAL GREC 138-kV STRUCTURE

Source: ECT, 2009.

Gainesville Renewable Energy Center
An American Renewables Company

Conductors will be sized at 795-thousand-circular-mil (kcmil) aluminum conductor, steel-reinforced (ACSR) alumoweld core. Conductors will be designed to operate at 212°F. Minimum clearance to ground under maximum operating conditions will be 24 ft. Maximum current rating (MCR) for this new line will be 500 amperes.

Transmission line conductor clearances will vary along the length of this short route; however, in all instances, the clearances will comply with the National Electrical Safety Code (NESC) (Institute of Electrical and Electronics Engineers, Inc. 2007) as required by Section 366.04, F.S., and Section 25-6.0345, F.A.C.

9.2.2 ELECTRICAL SWITCHYARD

The GREC onsite 138-kV transmission line will interconnect to a new electrical switchyard located just outside the GREC Site but within the DGS certified site. Figure 9.0.0-1 depicts the location of this switchyard. Figure 9.2.2-1 depicts the specific location and relative dimensions of this facility.

The fenced portion of the switchyard site will be 220 by 140 ft in size (approximately 0.7 acre). Figure 9.2.2-2 provides a plan view of the layout of the switchyard, and Figure 9.2.2-3 provides cross-sectional drawings (profile view) of the switchyard and facilities.

The switchyard will be certified as part of this application, and it will be constructed by GREC LLC. However, it will be owned and operated by GRU.

9.2.3 MULTIPIPELINE CORRIDOR

Figure 9.0.0-1 indicates a 14-ft wide multipipeline corridor that will contain two separate service pipelines in separate trenches from the GREC Site to the GRU DGS power block area. The temporary construction trenches will be 7 ft apart and generally located along or under existing DGS service roadways.

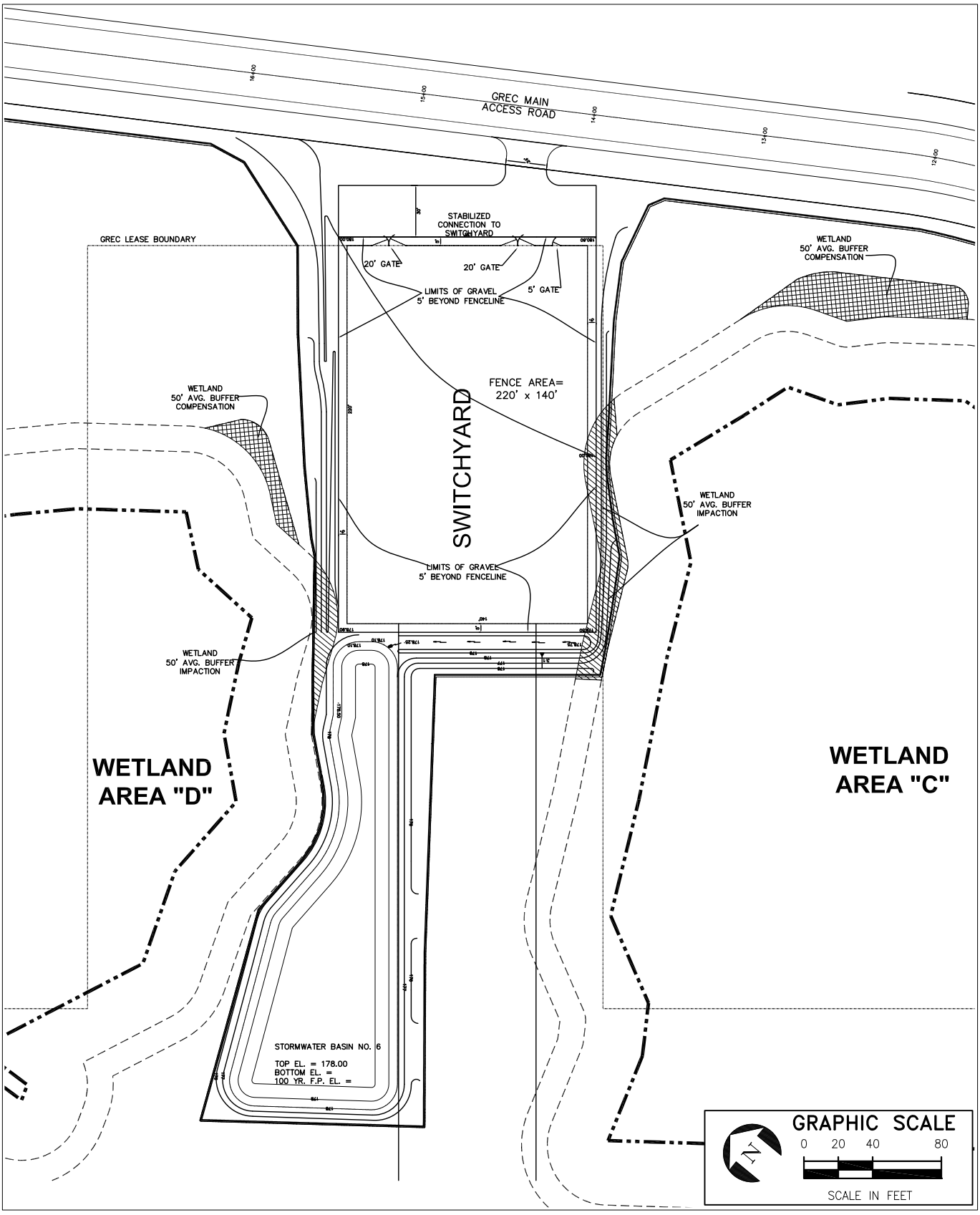

FIGURE 9.2.2-1.

PLOT PLAN OF THE 138-kV ELECTRICAL SWITCHYARD

Source: EDA, 2009; ECT, 2009.

Gainesville Renewable Energy Center
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GRAPHIC SCALE
0 5 10 20
SCALE IN FEET

LEGEND

ELECTRICAL MATERIAL LIST

1. - 138KV HORIZONTAL MOUNT DISCONNECT
2. - 138KV SF6 GAS CIRCUIT BREAKER
3. - 138KV COUPLING CAPACITOR VOLTAGE TRANSFORMER

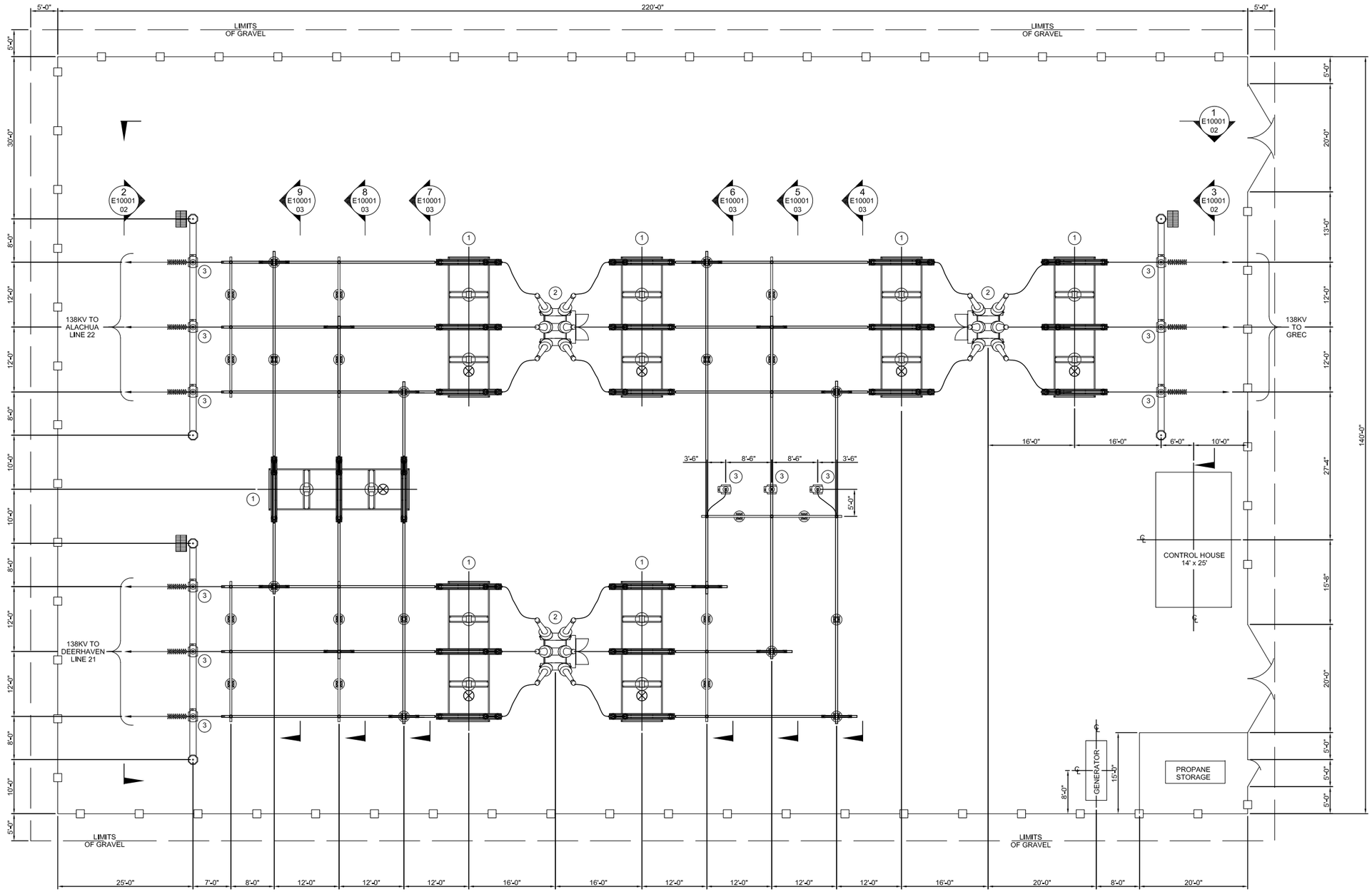

FIGURE 9.2.2-2.

PROPOSED SWITCHYARD PLAN VIEW

Source: Zachry, 2009; ECT, 2009.

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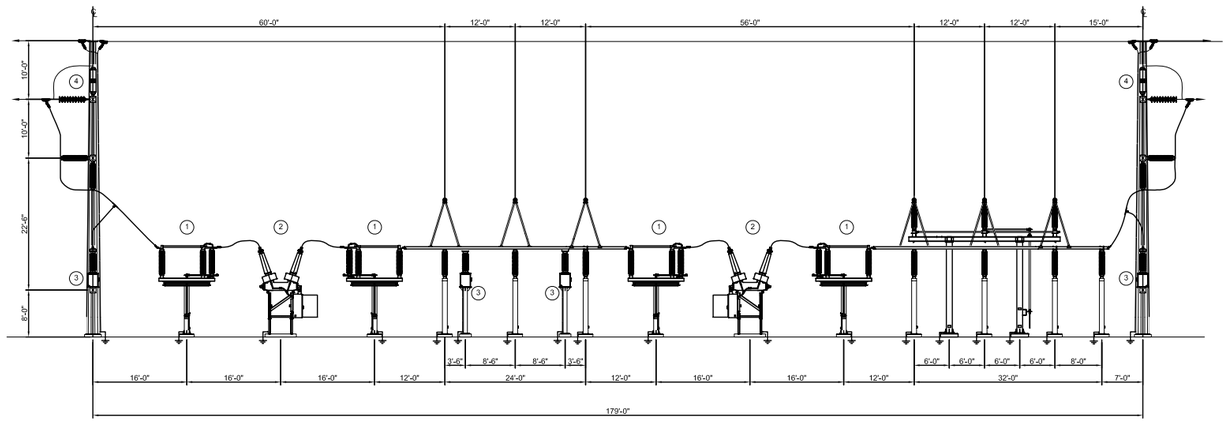
An American Renewables Company



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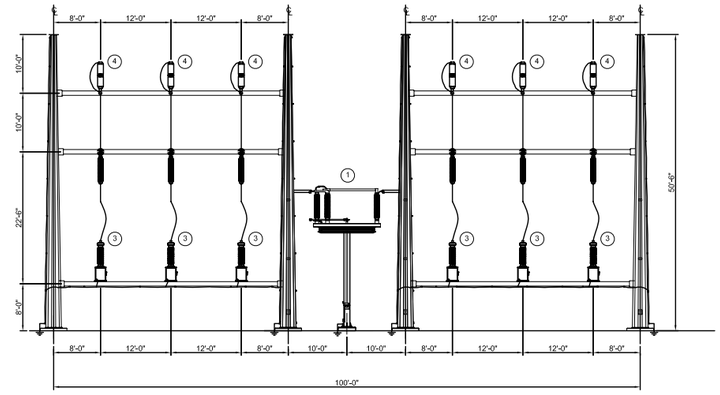

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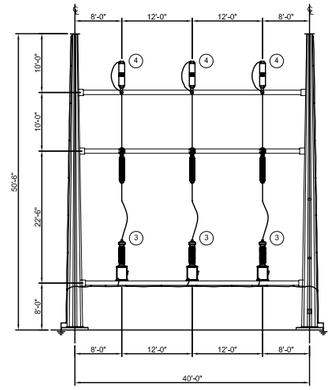

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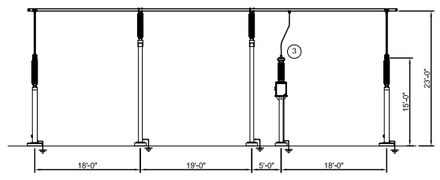
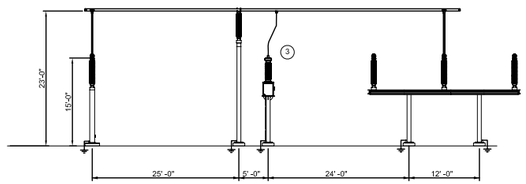
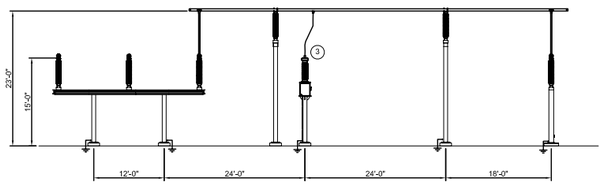


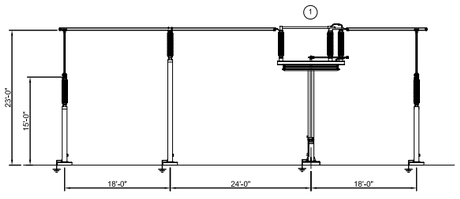
SECTION 4 E10001 01



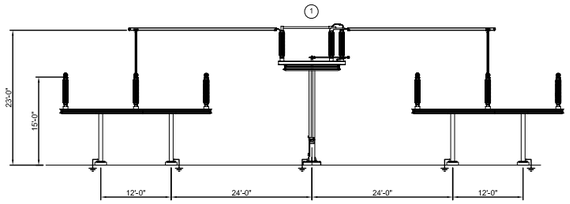
SECTION 5 E10001 01



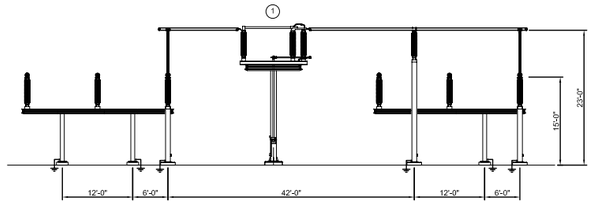
SECTION 6 E10001 01



SECTION 7 E10001 01



SECTION 8 E10001 01



SECTION 9 E10001 01

LEGEND

ELECTRICAL MATERIAL LIST

1. 138KV HORIZONTAL MOUNT DISCONNECT
2. 138KV SF6 GAS CIRCUIT BREAKER
3. 138KV COUPLING CAPACITOR VOLTAGE TRANSFORMER
4. 98KV MCOV LIGHTNING ARRESTOR

FIGURE 9.2.2-3.

PROPOSED SWITCHYARD CROSS-SECTIONAL VIEWS

Source: Zachry, 2009; ECT, 2009.

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An American Renewables Company

The two pipes contained within this corridor consist of a 6- to 8-inch natural gas pipeline and a 4-inch sanitary sewer pipeline. Each will be buried at a depth of approximately 36 inches.

Figure 9.2.3-1 depicts a typical cross-section of the two pipes. The entirety of this corridor will be located on GRU DGS property and will be certified as part of this application. GRU, however, will own and operate the pipelines.

9.2.4 PERMANENT NEW ACCESS ROAD/DRIVEWAY

A new permanent access road into GREC will be constructed off U.S. 441 at the current location of the DGS construction entrance (see Figure 9.0.0-1.). This new access road will consist of widening and improving the entrance to the existing construction access road. The entrance will be designed for three lanes; one will be a 14-ft, inbound lane, and two will be 12-ft outbound lanes to accommodate vehicles exiting and turning in either direction onto U.S. 441. From the entrance, the new road will taper down to two single lanes of 14 ft each in width for a total overall width of 28 ft. Each lane will include 6-ft-wide shoulders. Figure 9.2.4-1 depicts a typical cross-section. At the entrance from U.S. 441, the existing acceleration and deceleration turning lanes will be lengthened. Figure 9.2.4-2 shows those plans.

9.2.5 TEMPORARY CONSTRUCTION ACCESS ROAD

A temporary construction access road will be used by GREC from the new plant access road/entrance onto the DGS property to the location of the proposed construction laydown areas (see Figure 9.0.0-1). This construction access road will consist of improving an existing GRU unpaved service road that is approximately 18 ft in width. The construction access road will be widened in certain areas to approximately 24 ft wide to accommodate two-way traffic where needed.

9.3 CORRIDORS

9.3.1 CORRIDOR SELECTION

The corridors proposed for this project were selected in consultation with GRU since the corridors are located within their existing DGS certified site. Therefore, no formal

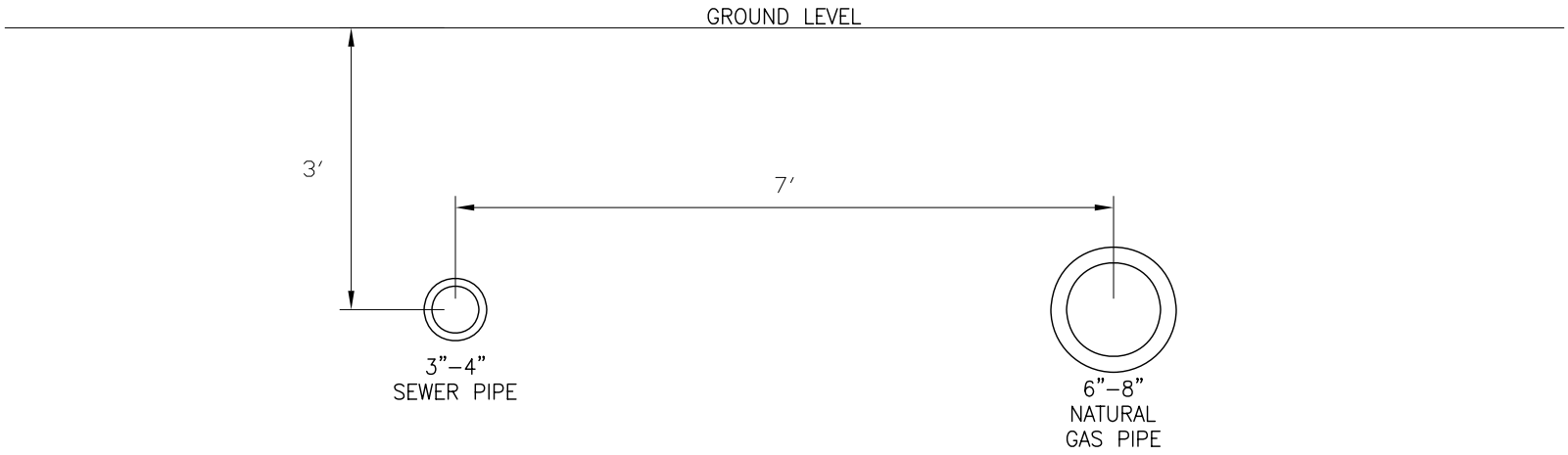
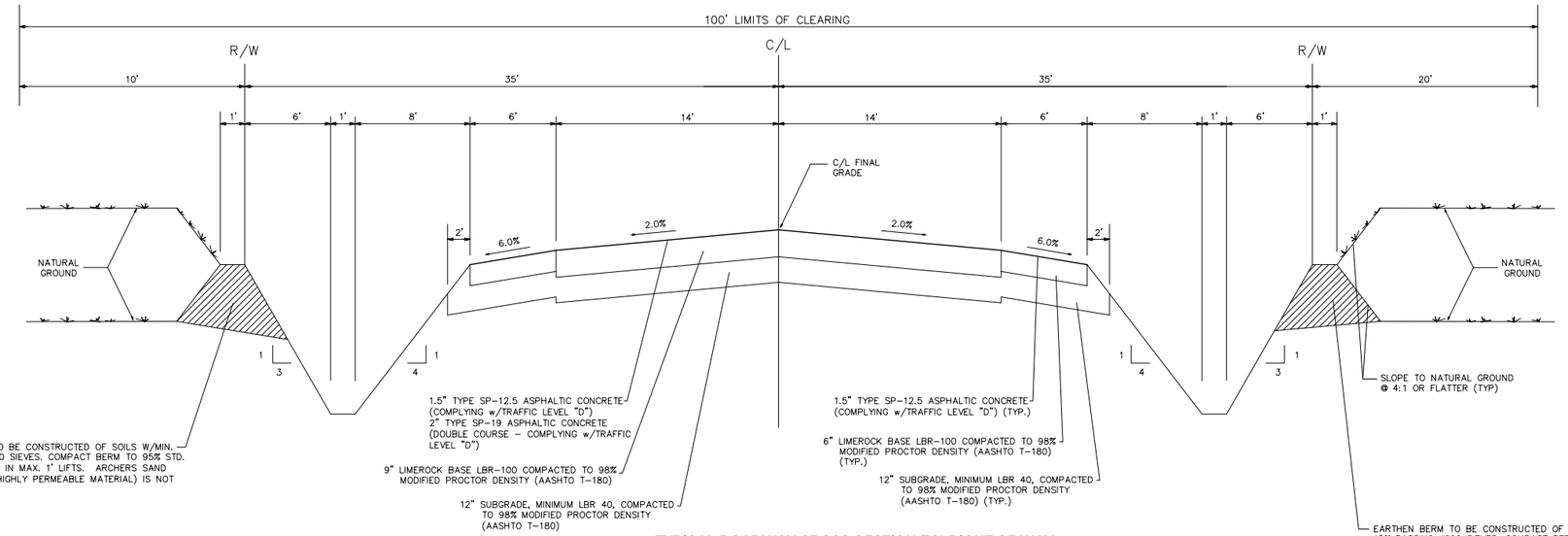


FIGURE 9.2.3-1.
TYPICAL CROSS-SECTION OF PIPES

Source: ECT, 2009.

Gainesville Renewable Energy Center
An American Renewables Company



TYPICAL ROADWAY CROSS-SECTION 70' RIGHT-OF-WAY
DESIGN SPEED - 30 MPH
NOT TO SCALE

PAVING, GRADING AND DRAINAGE SPECIFICATIONS

1. GENERAL: ALL ROADWAY AND DRAINAGE CONSTRUCTION, INCLUDING MATERIALS, CONSTRUCTION TECHNIQUES, AND TECHNICAL STANDARDS, SHALL BE IN ACCORDANCE WITH THE LATEST F.D.O.T. STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, AND THE LATEST F.D.O.T. ROADWAY AND TRAFFIC DESIGN STANDARDS.

2. ALL AREAS OF NEW CONSTRUCTION SHALL BE PREPARED AFTER SITE DEMOLITION. TOP SOIL REMAINING ONSITE MAY BE STOCKPILED FOR FINE GRADING IN LANDSCAPED AREAS, IF SUITABLE. THE CONTRACTOR SHALL FURNISH ALL FILL REQUIRED AND DISPOSE OF ALL EXCESS OR UNSUITABLE MATERIAL OFFSITE IN ACCORDANCE WITH ALL REGULATORY REQUIREMENTS.

3. ALL NEW ASPHALT PAVEMENT CONSTRUCTION SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:

A. EARTHWORK: FILL MATERIALS SHALL CONFORM TO AASHTO SOIL GROUPS A-1, A-3, OR A-2-4 AND SHALL BE PLACED IN 6"-12" LOOSE LIFTS AND COMPACTED TO 95% DENSITY USING MODIFIED PROCTOR METHOD (AASHTO T-180).

B. SUBSOIL EXCAVATION: WHERE SUBSOIL EXCAVATION IS REQUIRED, UNSUITABLE MATERIALS SHALL BE REMOVED TO A DEPTH OF 18" BELOW THE LIMEROCK BASE AND BACKFILLED WITH CLEAN FILL.

C. STABILIZED SUBGRADE: ALL STABILIZED MATERIAL SHALL BE TYPE 'B' CONFORMING TO SECTION 914-3 AND PLACED ACCORDING TO SECTION 160 IN ONE 12" MINIMUM COMPACTED LIFT. SUBGRADE SHALL BE STABILIZED TO A MINIMUM LBR VALUES AND DENSITIES AS SHOWN IN THE TYPICAL SECTIONS.

D. BASE COURSE: ALL MATERIAL SHALL BE LIMEROCK CONFORMING TO SECTION 911 AND PLACED ACCORDING TO SECTION 200 IN ONE 6" MINIMUM COMPACTED LIFT OR DOUBLE COMPACTED LIFT. ALL BASE MATERIAL SHALL BE COMPACTED TO 98% DENSITY BY MODIFIED PROCTOR METHOD (AASHTO T-180). THE PRIME COAT SHALL CONFORM TO SECTION 300.

E. ASPHALTIC CONCRETE: ALL ASPHALTIC CONCRETE MATERIAL SHALL BE 1-1/4" THICK F.D.O.T. TYPE SP-12.5 AND SHALL CONFORM TO TYPE SP-12.5 AS PER DESIGN SECTIONS SECTION 330. ALL ASPHALTIC CONCRETE CONSTRUCTION SHALL CONFORM TO SECTION 330.

4. ALL CONCRETE USED FOR CONSTRUCTION OF DRAINAGE STRUCTURES, SIDEWALKS, AND CURBING SHALL BE CLASS I CONFORMING TO SECTION 346.

5. PVC STORM SEWER SHALL BE ASTM D-3034, SDR 35 6. SIDEWALK SHALL BE CONSTRUCTED IN ACCORDANCE WITH SECTION 522.

7. REINFORCED CONCRETE PIPE SHALL CONFORM TO SECTION 941.

8. ALL PAVEMENT MARKINGS REQUIRED IN THE R/W SHALL BE THERMOPLASTIC AND INCLUDE RAISED PAVEMENT MARKERS, WHERE REQUIRED CONFORMING TO SECTION 711.

9. ALL PAVEMANT MARKING, SYMBOLS AND STRIPING WITHIN THE SITE SHALL MEET THE LATEST FLORIDA HANDICAP ACCESSIBILLITY CODE. PAVEMENT MARKING SHALL BE 4" BLUE/WHITE (HANDICAP) OR WHITE (REGULAR) AND SHALL CONFORM TO THE LATEST F.D.O.T. AND M.U.T.C.D. STANDARDS.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A GEOTECHNICAL CONSULTANT TO PROVIDE A FIELD INVESTIGATION REPORT DELINEATING RECOMMENDATIONS FOR UNDERCUTTING AND/OR UNDERDRAINS. A COPY OF THIS REPORT SHALL BE FORWARDED TO THE OWNER AND ENGINEER FOR REVIEW AND APPROVAL PRIOR TO UNDERCUTTING OR INSTALLING UNDERDRAIN. UNIT PRICES SHALL BE PROVIDED FOR UNDERDRAIN AND UNDERCUTTING. THE CONTRACTOR SHALL NOT CONSTRUCT BASE COURSE UNTIL THE REPORT IS REVIEWED AND APPROVED BY THE OWNER AND THE ENGINEER.

11. SOIL TESTING RESULTS SHALL BE PROVIDED FOR THE PAVEMENT CONSTRUCTION. TESTING RESULTS SHALL BE SUBMITTED FOR THE SUBGRADE AND BASE COURSE, IN ACCORDANCE WITH THE DESIGN SECTION. A MINIMUM OF 5 TEST LOCATIONS SHALL BE PROVIDED ONSITE. THE TESTING REPORT SHALL DENOTE THE TEST LOCATIONS. THE CONTRACTOR SHALL NOT PROCEED TO THE SUBSEQUENT PAVEMENT SECTION UNTIL TESTING -RESULTS ARE APPROVED FOR PREVIOUS SECTION. ALL TESTING REQUIRED WITHIN THE COUNTY R/W SHALL BE COORDINATED WITH THE COUNTY INSPECTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TESTING COST.

12. LANDSCAPING: FINAL GRADING IN OPEN AREAS AND LANDSCAPE ISLANDS SHALL BE COORDINATED WITH THE LANDSCAPE CONTRACTOR AND THE OWNER. THE CONTRACTOR SHALL ALSO COORDINATE THE PLACEMENT OF ANY IRRIGATION AND ELECTRICAL CONDUIT SLEEVES DURING CONSTRUCTION.

FIGURE 9.2.4-1.

TYPICAL ACCESS ROADWAY CROSS-SECTION

Sources: EDA, 2009; ECT, 2009.

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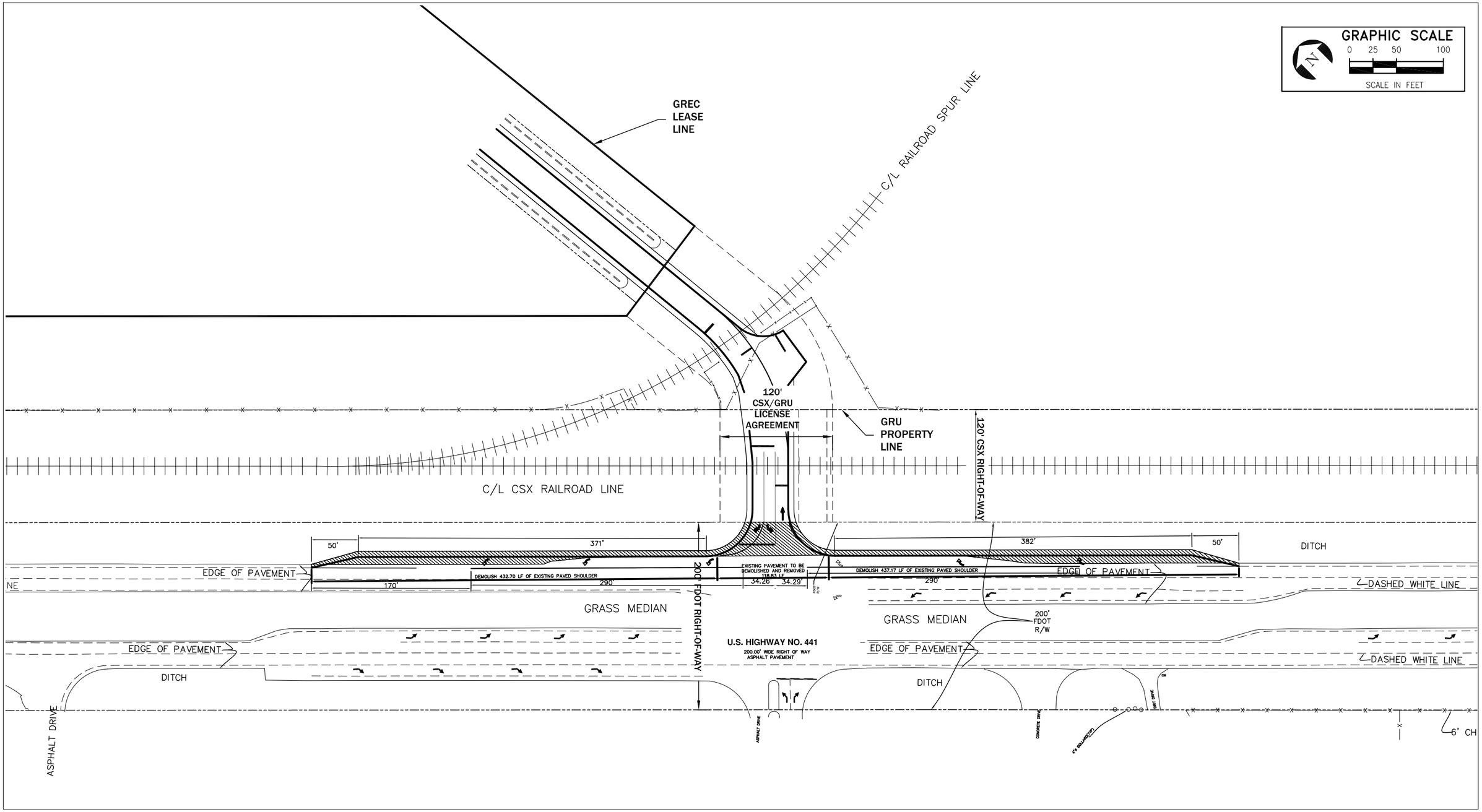

FIGURE 9.2.4-2.

PLAN VIEW OF ENTRANCE ROAD

Source: EDA, 2009; ECT, 2009.

Gainesville Renewable Energy Center
An American Renewables Company

corridor selection process was performed or warranted. Figure 9.3.1-1 depicts the proposed corridors and existing transmission lines within 5 miles that are 115 kV or greater.

9.3.2 CORRIDOR DESCRIPTION

The corridors were previously described in the first few paragraphs of this Chapter 9.0 and shown on Figures 9.0.0-1 and 9.0.0-2.

9.3.3 ALTERNATE CORRIDORS

No alternate corridors are being proposed by GREC LLC.

9.3.4 ACCESS ROADS

Access roads are already described for this project in the first few paragraphs of this Chapter 9.0.

9.3.5 COST PROJECTIONS

The following are the estimated costs (2009 dollars) for the transmission line portion of the linear facilities:

- 138-kV transmission line from the new GRU-owned switchyard to GREC plant switchyard—$1,200,000 (excluding right-of-way clearing).
- 138-kV line taps from the existing GRU line to new GRU-owned switchyard—$400,000 (excluding right-of-way clearing).
- GRU-owned switchyard—$3,750,000.

The total cost for the transmission line portion (excluding clearing) and new GRU-owned switchyard construction is estimated to be $5,350,000.

9.3.6 SOCIAL AND POLITICAL ENVIRONMENT OF THE CORRIDOR AREAS

9.3.6.1 Governmental Jurisdictions

Figure 9.3.6-1 depicts the governmental jurisdictions within 0.5 mile of the corridors. The proposed linear facilities fall within the GRU DGS property, which is the City of Gainesville's jurisdiction. Other major jurisdictions include the City of Alachua across U.S. 441

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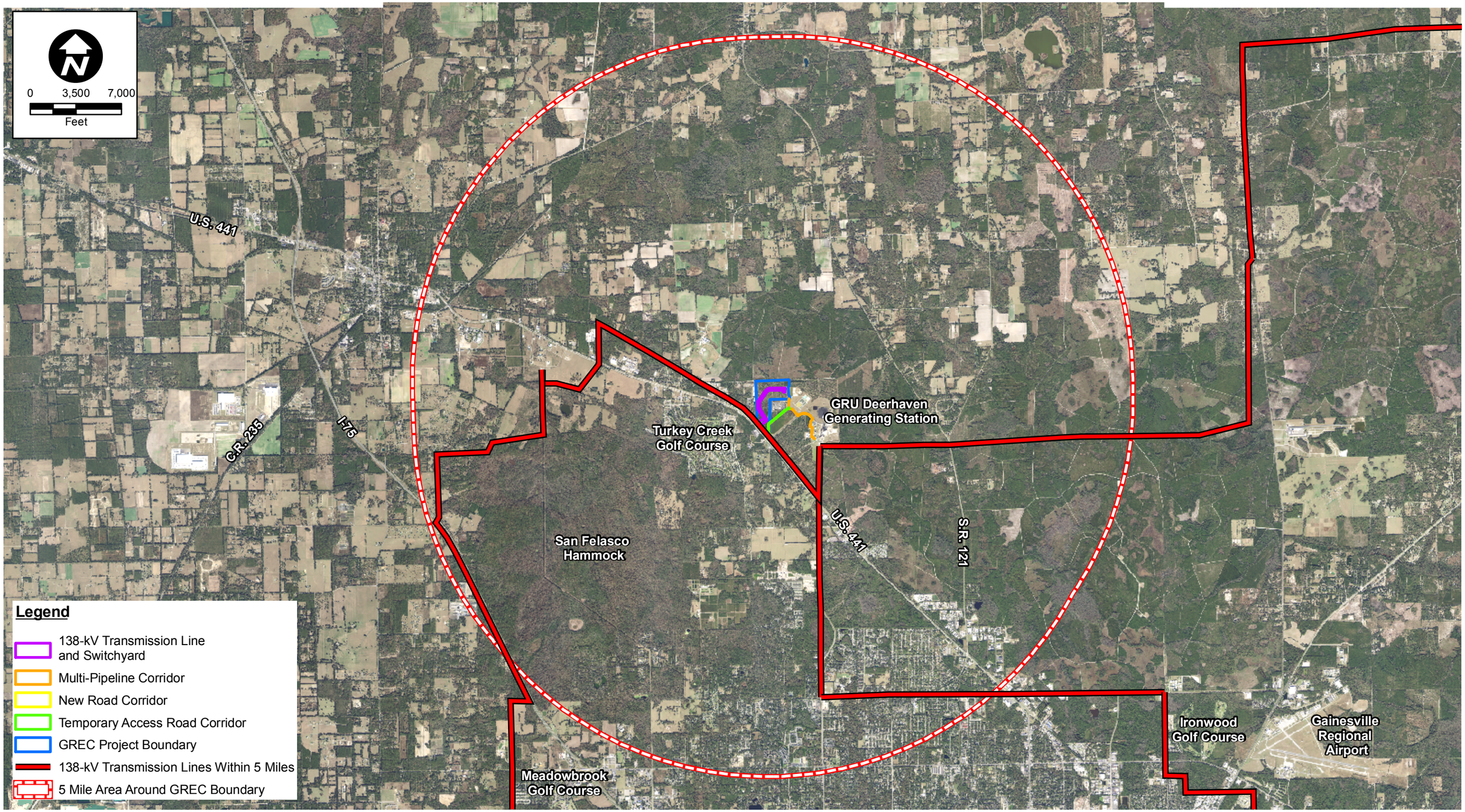

FIGURE 9.3.1-1.

EXISTING TRANSMISSION LINES 115-kV OR GREATER WITHIN 5 MILES

Source: FDOT, 2008; GRU, 2009; Genesis, 2009; ECT, 2009.

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An American Renewables Company

File: M:\acad\090408\SCA_Government_Juris.mxd

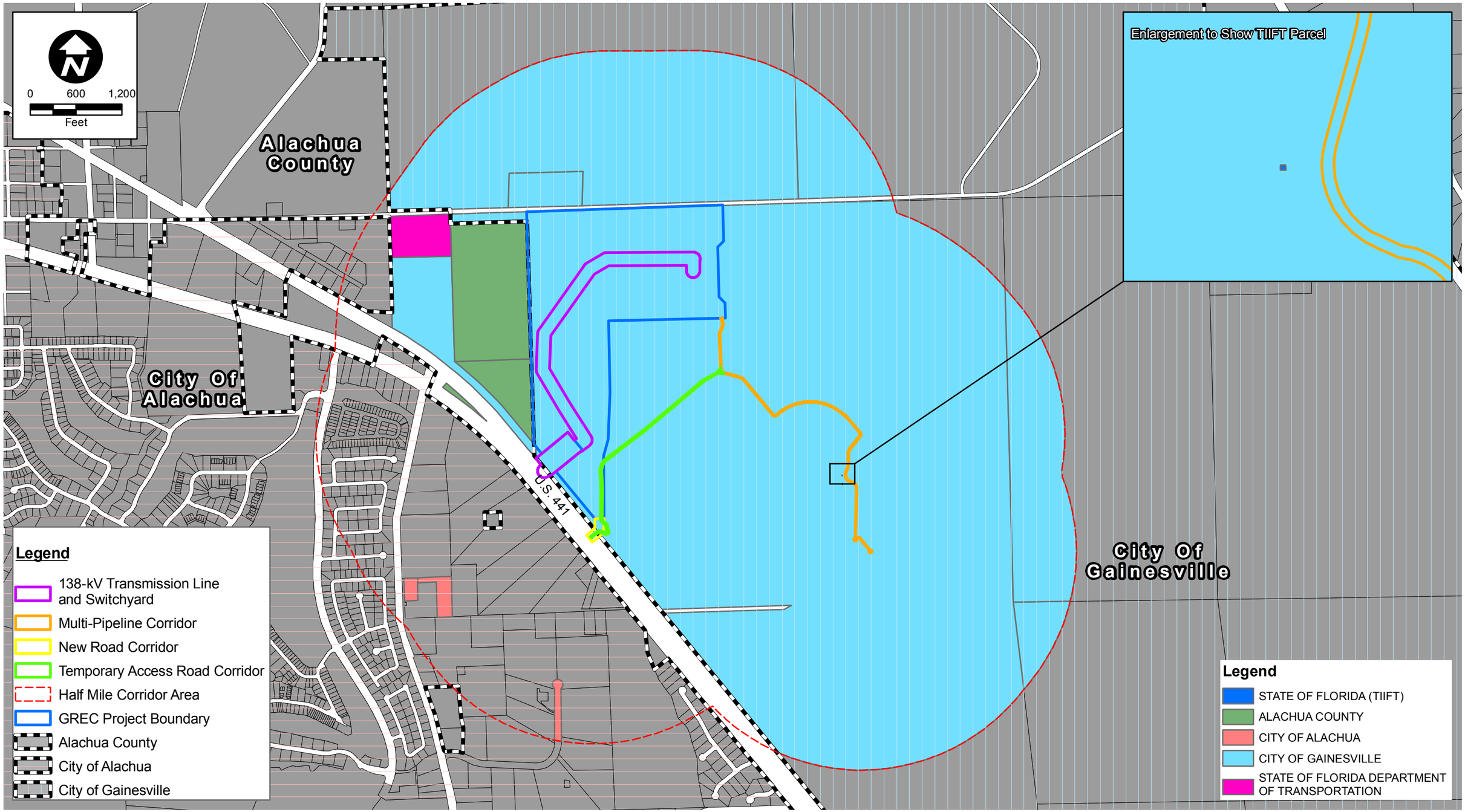

FIGURE 9.3.6-1.

GOVERNMENTAL JURISDICTIONS

Source: FDOT, 2008; Alachua County, 2009; Genesis, 2009; ECT, 2009.

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from the corridors and Alachua County, which surrounds the DGS property on the north and east. Of note is the extremely small (25-ft^2) parcel of state of Florida (Trustees of the Internal Improvement Trust Fund [TIITF]) property located on the GRU site adjacent to the multipipeline corridor. This property contains a water monitoring well.

No other governmental jurisdictions are found within 0.5 mile of the corridors.

9.3.6.2 Zoning and Land Use Plans

To assist in characterizing the areas through which the proposed linear corridors are to be located, the following subsections describe the various future land use categories and zoning districts as crossed by the proposed corridors.

Comprehensive Future Land Use Plan

Figure 9.3.6-2 depicts the onsite and surrounding future land use designations. The DGS site, including the GREC Site, has been designated Public Facilities (PF) since the City's annexation of the property. This land use category identifies administrative and operational governmental functions such as government offices, utility facilities, and storage facilities. Appendix 10.5 provides applicable portions of the City of Gainesville's Comprehensive Land Use Plan.

Zoning

Figure 9.3.6-3 depicts the location of the various proposed corridors in relation to the adopted zoning districts of the local governments traversed. The DGS site is designated as a Public Services and Operations (PS) zone district and therefore includes the linear facilities proposed in GREC's application. This was the assigned zoning district after annexation by Gainesville of the DGS property in 1981. Since the zoning district was approved in 1982, the LDC has been updated to require permitted uses to be specified in the Public Services and Operations zoning districts. The City initiated an amendment to the existing Public Services and Operations zoning district encompassing the DGS property in May 2009 to add permitted uses. The permitted uses include all those currently existing on the DGS site and two new uses: communication towers and facilities and green industries that assist in reducing reliance on fossil fuels. The proposed permitted uses

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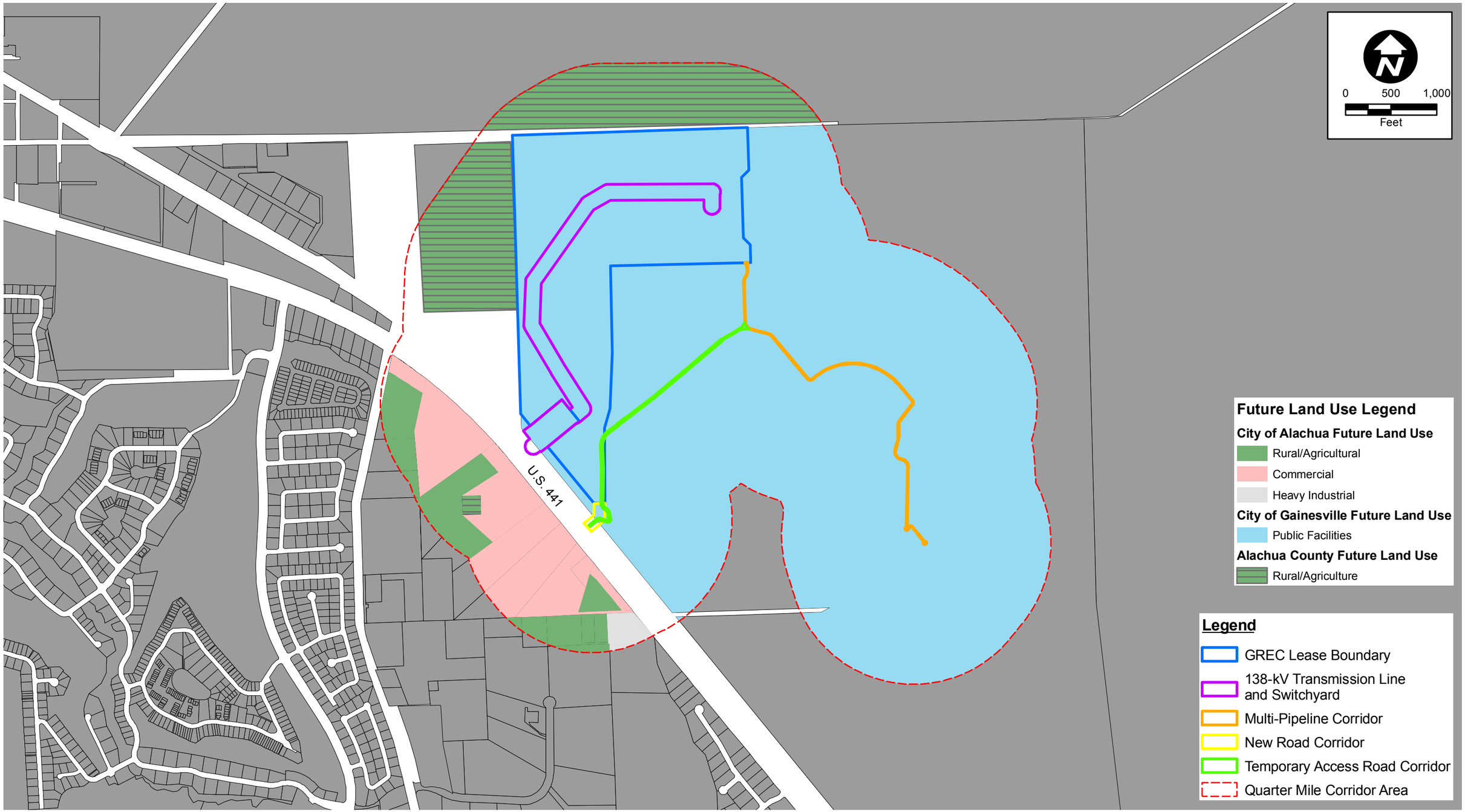

FIGURE 9.3.6-2.

FUTURE LAND USE MAP

Source: City of Gainesville, 2009; City of Alachua, 2009; Alachua County, 2009; Genesis, 2009; ECT, 2009.

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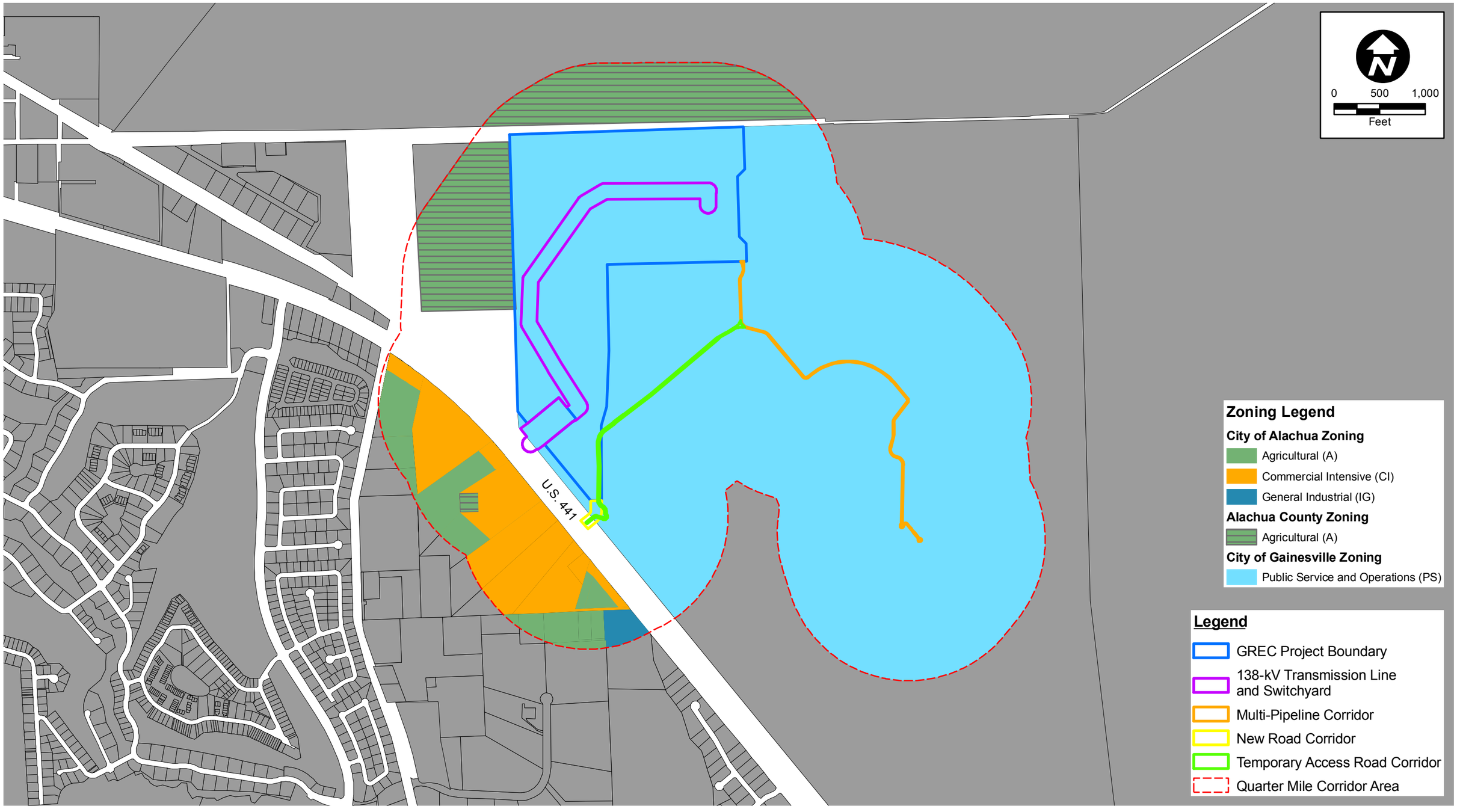

FIGURE 9.3.6-3.

ZONING MAP

Source: City of Gainesville, 2009; City of Alachua, 2009; Alachua County, 2009; Genesis, 2009; ECT, 2009.

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allow for a biomass electric generating facility such as GREC. Appendix 10.3 provides applicable portions of the City of Gainesville's LDC.

Switchyard and 138-kV Transmission Line

Both these electrical facilities fall within the Public Facilities Future Land Use Plan category and the Public Service and Operations (PS) zoning district.

Multipipeline Corridor

The facilities have been generally described in the first few paragraphs of this Chapter 9.0. The only zone crossed by this proposed corridor is the Public Service and Operations (PS) zone district and correspondingly, the Public Facilities Future Land Use category.

New Main Access Road Corridor

The new road corridor has been generally described in the first few paragraphs of this Chapter 9.0. As with the proposed multipipeline corridor, the only zone crossed by this proposed corridor is the Public Service and Operations (PS) zone district and correspondingly, the Public Facilities Future Land Use category. It should be noted that this new road corridor will permanently connect to U.S. 441 and cross an FDOT right-of-way along the highway, as well as an existing CSX railroad line corridor.

Temporary Construction Road Corridor

Generally, as described in the first few paragraphs of this Chapter 9.0, the temporary road will provide access during the construction phase of this project. As proposed, the temporary corridor crosses only the Public Service and Operations (PS) zone district and Public Facilities land use category. As with the new main access road corridor, the temporary road corridor will connect to U.S. 441 and cross an FDOT right-of-way and an existing CSX railroad line corridor.

9.3.6.3 Easements, Title, and Agency Works

The only two currently identified agency approvals would be an FDOT approval for the expanded construction entrance (driveway permit) and turn lanes along U.S. 441 and an

easement for the onsite TIITF parcel only if any portion of GREC's multipipeline corridor will cross this small parcel. GREC is currently planning on avoiding this parcel with its multipipeline corridor.

In addition, the current license between the City of Gainesville, d/b/a GRU, and CSX will be expanded to allow for the wider roadway entrance where the main access road for GREC crosses the railroad.

9.3.6.4 Vicinity Scenic, Cultural, and Natural Landmarks

Please refer to Subsection 3.2.5 for a description of these features in the proximity to the GREC site.

9.3.6.5 Archaeological and Historic Sites

Please refer to Subsection 3.2.6 for a description of these features in proximity to the GREC site.

9.3.7 BIOLOGICAL AND PHYSICAL ENVIRONMENT OF THE CORRIDOR AREAS

9.3.7.1 Land Use/Vegetation

The offsite linear facilities are routed primarily within existing cleared areas, with most occurring in or adjacent to existing roads. Figure 9.3.7-1 depicts land use/land cover types within 0.5 mile of the proposed corridor features. Land use types within the proposed corridors include other open land (grassed fields or easement), manmade ditches/swales (512), pine plantation (441), mixed conifer-hardwood forest (434), hydric pine plantation (626), roads (814), and electric power facilities (831). The majority of the corridor has been cleared, is routinely mowed, and is primarily vegetated by bahia grass, vasey grass, Bermuda grass, and other early successional or weedy herbaceous species. Populations of the invasive species cogon grass and torpedo grass were observed within the corridors. The only forested area within the proposed corridors is in the location of the proposed GRU-owned switchyard and the 300-ft portion of the transmission line between the switchyard and GRU's existing transmission line along U.S. 441. This forest stand has been managed for silviculture activities and is traversed by a logging road. Species composition for the other open land, swales, upland and hydric pine plantation, and

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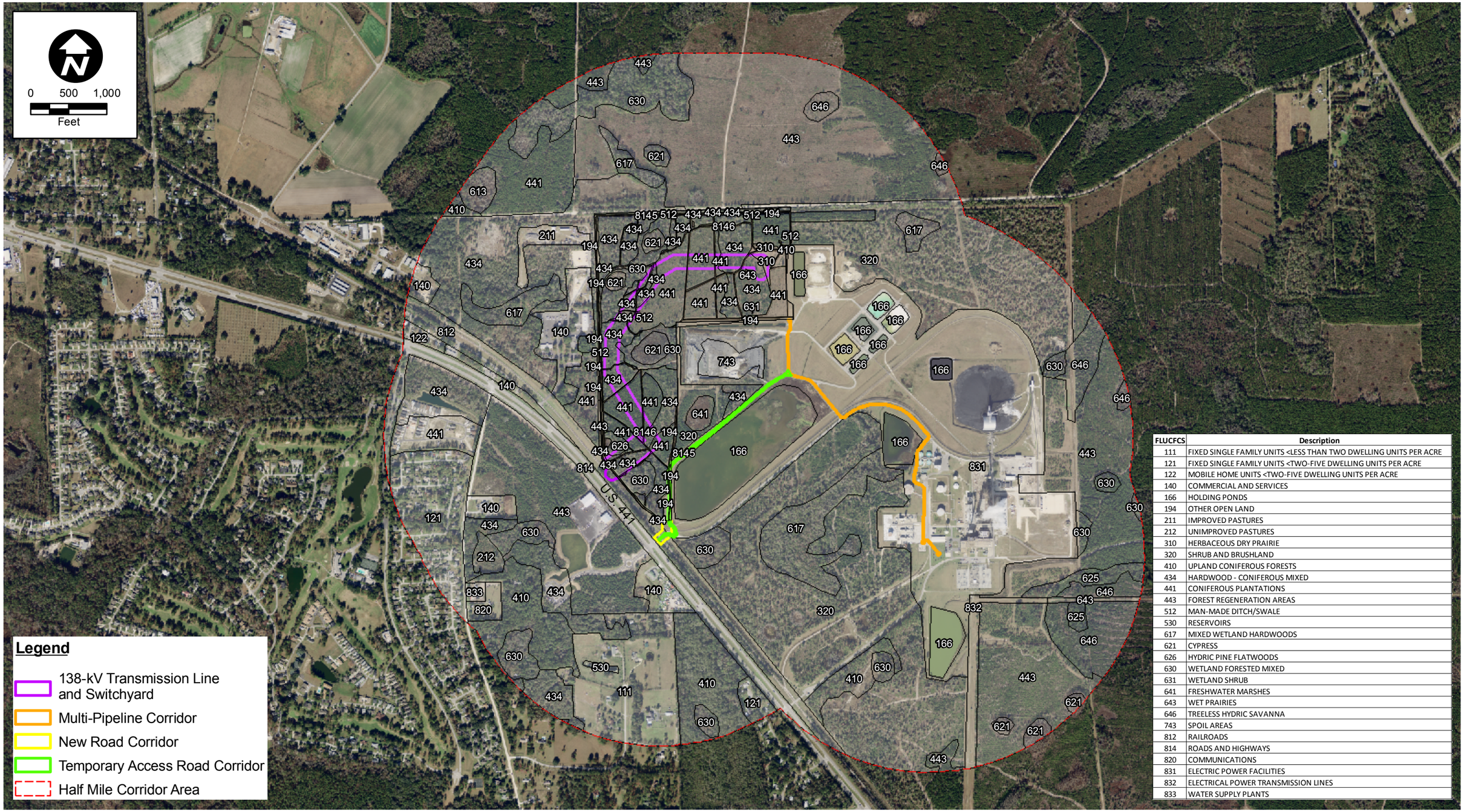

FLUCFCS	Description
111	FIXED SINGLE FAMILY UNITS <LESS THAN TWO DWELLING UNITS PER ACRE
121	FIXED SINGLE FAMILY UNITS <TWO-FIVE DWELLING UNITS PER ACRE
122	MOBILE HOME UNITS <TWO-FIVE DWELLING UNITS PER ACRE
140	COMMERCIAL AND SERVICES
166	HOLDING PONDS
194	OTHER OPEN LAND
211	IMPROVED PASTURES
212	UNIMPROVED PASTURES
310	HERBACEOUS DRY PRAIRIE
320	SHRUB AND BRUSHLAND
410	UPLAND CONIFEROUS FORESTS
434	HARDWOOD - CONIFEROUS MIXED
441	CONIFEROUS PLANTATIONS
443	FOREST REGENERATION AREAS
512	MAN-MADE DITCH/SWALE
530	RESERVOIRS
617	MIXED WETLAND HARDWOODS
621	CYPRESS
626	HYDRIC PINE FLATWOODS
630	WETLAND FORESTED MIXED
631	WETLAND SHRUB
641	FRESHWATER MARSHES
643	WET PRAIRIES
646	TREELESS HYDRIC SAVANNA
743	SPOIL AREAS
812	RAILROADS
814	ROADS AND HIGHWAYS
820	COMMUNICATIONS
831	ELECTRIC POWER FACILITIES
832	ELECTRICAL POWER TRANSMISSION LINES
833	WATER SUPPLY PLANTS

FIGURE 9.3.7-1.

LAND COVER / VEGETATION

Source: FDOT, 2008; SRWMD, 2004; Genesis, 2009; ECT, 2009.

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mixed hardwood conifer forest communities are similar to those described in Subsection 3.3.5.

There are no known locations of federal- or state-listed threatened or endangered plant species within the offsite linear facilities corridors. There is moderately suitable habitat for poppy mallow, a state-listed endangered plant that can inhabit dry pinelands, fields, roadsides, or upland mixed forest. However, no individuals of this species were observed during the field surveys. There is no suitable habitat for the other listed plant species with potential to occur in the vicinity of the GREC Site.

9.3.7.2 Affected Waters and Wetlands

Wetlands within the offsite linear facilities corridors primarily include manmade swales and stormwater management basins and marshes; however, there is a small area of forested wetland (hydric pine plantation) in the vicinity of the switchyard. Most of the swales are along road rights-of-way or located to drain grassed fields into the existing DGS stormwater management basins. These features tend to be vegetated with herbaceous species similar to those described for the marsh and wet prairie communities in Subsection 3.3.5. These wetlands hold water during the wetter time of the year, and some are flooded year round. Impacts to forested wetlands will be avoided. Impacts to swales would be temporary and could include temporary excavation for pipe installation and culvert replacement, where needed. Wetlands temporarily impacted during pipeline installation would be restored to preconstruction contours. Wetland impacts are addressed in detail in the project's ERP application included in Appendix 10.4.1.

9.3.7.3 Ecology

The ecological resources found in and around the GREC Site and DGS property have been described in Subsection 3.3.6. The associated linear features cross the same habitats and could potentially have the same plant and animal species occupying these corridors. However, special ecological surveys were conducted along the linear features to map wetlands and note the presence of listed species. Table 9.3.7-1 presents a list of listed wildlife species observed in and near the associated linear facilities in September 2009.

Table 9.3.7-1. Wildlife Observed Within or Adjacent to the GREC Offsite Linear Facilities—September 2009

Common Name	Scientific Name	Location in Which Observed: Multipipeline Corridor	Construction Access Road Areas—Offsite Marsh/Pond	Construction Access Road	Offsite GRU Switchyard and Transmission Lines	Other*
Reptiles						
American alligator	*Alligator mississippiensis*					V†
Birds						
Red-winged blackbird	*Agelaius phoeniceus*	V				
Florida duck	*Anas fulvigula*			V		
American anhinga	*Anhinga anhinga*	V	V			
Great blue heron	*Ardea herodias*	V		V		
Cattle egret	*Bubulcus ibis*	V				
Red-shouldered hawk	*Buteo lineatus*				H	
Green heron	*Butorides striatus*		V			
Great egret	*Casmerodius albus*		V			
Killdeer	*Charadrius vociferous*			V		
Black vulture	*Coragyps atratus*	V				
Black-bellied whistling duck	*Dendrocygna autumnalis*	V				
Gray catbird	*Dumetella carolinensis*				H	
Snowy egret ‡	*Egretta thula*		V			
White ibis ‡	*Eudocimus albus*	V				
Common gallinule	*Gallinula chloropus*		V			
Tree swallow	*Iridoprocne bicolor*					
Red-headed woodpecker	*Melanerpes erythrocephalus*				V	
Wood stork ‡	*Mycteria americana*		V	V		
Great-crested flycatcher	*Myiarchus crinitus*				H	
Osprey	*Pandion haliaetus*			V		
Tufted titmouse	*Parus bicolor*				V	
Carolina wren	*Thryothorus ludovicianus*			V		
White-eyed vireo	*Vireo griseus*			V		
Mourning dove	*Zenaida macroura*	V				
Mammals						
Nine-banded armadillo	*Dasypus novemcinctus*				S	
White-tailed deer	*Odocoileus virginianus*	V			V	
Raccoon	*Procyon lotor*				S	

Note: V = visual siting. H = auditory identification. S = other physical evidence.

*Other species observed flying over the GREC Site or along adjacent roads/habitats.
†Offsite pond.
‡Federal- or state-listed species.

Source: ECT, 2009.

9.3.7.4 Other Environmental Features

There are no other environmental features to address that have not already been addressed in previous sections.

9.4 EFFECTS OF RIGHT-OF-WAY PREPARATION AND TRANSMISSION LINE CONSTRUCTION

9.4.1 CONSTRUCTION TECHNIQUES

Construction techniques for the various linear facilities will generally consist of clearing (where required); electric lines, road, or pipe construction and installation; and restoration.

9.4.1.1 Clearing

Minimal clearing is expected for most of the linear facilities, because most follow existing DGS service or maintenance roads. The new switchyard is located in a forested area and will need to be completely cleared. However, care was taken to locate the switchyard site outside of wetlands (see Figure 9.2.2-1).

Where clearing is required for the transmission line, trees and shrubs that could exceed 14 ft in height will be evaluated for clearing and/or pruning. For the roads and pipelines, however, all vegetation within the right-of-way will initially be cleared.

9.4.1.2 Facility Construction

Construction will consist of various steps depending on the type of facility to be constructed. The new main access road and the temporary construction access roads will be the initial linear facilities constructed so construction equipment and materials for the biomass plant can be brought into the Site.

Transmission construction will consist of pole and caisson installation and installation of hardware and conductor stringing.

Pipeline construction will consist of trenching, pipe connection and installation, backfilling, and restoration.

The switchyard construction will begin with installation of stormwater/erosion control measures around the site to protect the nearby wetlands. Following that, the site will be cleared and graded, followed by excavation for the placing of concrete pads to support the installation of electrical components and fencing and restoration of surrounding vegetated areas. The switchyard is expected to be energized by mid-2012.

Typical construction equipment will consist of small and large flatbed trucks, cranes, bulldozers, backhoes, and other specialized equipment as necessary.

After construction, restoration efforts will consist of removal of construction and vegetation debris. Seeding, mulching, or planting may be employed as appropriate depending on the facility.

9.4.2 ENVIRONMENTAL RESOURCE PERMIT (ERP)

Appendix 10.4.1 of this SCA contains a copy of the ERP informational submittal for both the GREC Site and the associated linear corridors.

9.4.3 SOLID WASTES

Section 5.6 provides a description of construction related solid wastes. Solid waste generated by construction of the associated linear facilities will primarily consist of cleared vegetation, which will be disposed of appropriately onsite or in an approved landfill.

9.4.4 CHANGES TO VEGETATION, WILDLIFE, AND AQUATIC LIFE

Section 5.4 provides a description of these construction-related impacts. With respect to the associated linear corridors, little additional habitat will be affected for construction. No significant impacts to vegetation or wildlife should occur. No aquatic habitats will be affected by these facilities, so no impacts will occur to aquatic life.

9.4.5 IMPACT ON HUMAN POPULATIONS

Section 5.7 provides a description of construction-related impacts. The associated linear facilities will be located on an existing power plant property with limited access. Therefore no additional impacts to human populations should occur as a result of construction of these facilities.

9.4.6 IMPACT ON REGIONAL SCENIC, CULTURAL, AND NATURAL LANDMARKS

Section 5.8 provides a description of construction-related impacts. No impacts are expected to these resources as a result of construction of the linear facilities.

9.4.7 IMPACT ON ARCHAEOLOGICAL AND HISTORIC SITES

Section 5.9 provides a description of construction-related impacts. No impacts to known sites are expected as a result of the construction of these facilities. If artifacts are discovered during construction, work will stop in the area, and FDHR will be contacted for further instruction.

9.5 POSTCONSTRUCTION IMPACTS AND EFFECTS OF MAINTENANCE

9.5.1 MAINTENANCE TECHNIQUES

Since the linear facilities occur on existing GRU DGS plant property, GRU will maintain the areas as they currently do. That is, mowing and selected tree trimming/clearing will be performed to keep vegetation in a low-growing vegetative state along these facilities. The multipipeline corridor will be kept free of tree or shrub vegetation that might have root systems that could interfere with the integrity of the underground pipes. The road improvements and switchyard will be kept free of vegetation.

9.5.2 MULTIPLE USES

Except for the short crossing of the FDOT right-of-way and CSX property, the entirety of GREC's associated linear facilities are located within property controlled by GRU and not open to the public. Therefore, no multiple uses will be permitted along these facilities except the joint uses shared by GRU and GREC LLC.

9.5.3 CHANGES IN SPECIES POPULATIONS

The relatively small amount of additional habitat lost or altered due to maintenance and operation of these facilities will result in no regional or localized loss of species populations. Species inhabiting these areas will use existing similar habitats within the DGS property.

9.5.4 EFFECTS OF PUBLIC ACCESS

No new public access will be created into the property since this is already a controlled access site. No impacts from public access will occur.

9.5.5 OTHER POST CONSTRUCTION EFFECTS

9.5.5.1 EMF Effects

GREC's 138-kV transmission line and switchyard comply with the Florida EMF regulations specified in Section 62-814, F.A.C. (the Florida EMF Rule). The strength of the magnetic field under a transmission line is primarily a function of the amount of current carried by the line and the height of the conductors above the ground. The electric field is primarily a function of the voltage impressed on the line and conductor height above the ground. Consequently, the electric field near the transmission line is relatively constant over time, but the magnetic field fluctuates depending on customer demand for power.

The electric and magnetic fields produced by the proposed transmission line were calculated in accordance with the requirements of Section 62-814.460, F.A.C. The fields associated with the new transmission line comply with the standards set forth in the Florida EMF Rule, as demonstrated in Table 9.5.5-1. Although the current carried by the transmission line will vary throughout the day, the value used in the calculations is the maximum quantity of electric current that can be continuously carried on the conductors, as required by Chapter 62-814, F.A.C.

Three 138-kV overhead lines exit the switchyard: one owned by GREC exiting from the northeast side toward the generating facility and two owned by GRU exiting from the southwest side toward the existing GRU transmission corridor. To ascertain electric and

Table 9.5.5-1. Maximum EMF Capable of Being Produced by GREC 138-kV Transmission Line and Switchyard

Right-of-Way Configuration	Electric Field (kV/m)		Magnetic Field at MCR* on Edge of Right-of-Way (mG)
	On Right-of-Way	Edge of Right-of-Way	
GREC GRU Line 21 at edge of 25-ft right-of-way	0.42	0.42†	51.56†
GREC GRU Line 22 at edge of 25-ft right-of-way	0.42	0.42†	71.85†
GREC new line at mid-span (double contingency loading)	1.75	1.57	57.3
Switchyard cross-section 1 (GREC horizontal phasing entering) (see Figure 9.5.5-1)	0.71	0.46	17.79
Switchyard cross-section 2 (GRU horizontal phasing exiting) (see Figure 9.5.5-1)	0.70	0.67	49.66
Florida EMF Rule limit for new 230-kV lines‡	*8.0*	*2.0*	*150*

Note: kV/m = kilovolt per meter.
mG = milliGauss.

*The field levels shown in this table for Lines 21 and 22 (see Figure 9.2.2-2) are based on GRU-calculated loadings for the double-circuit contingency, which is a Category C5 situation. These loadings substantially exceed the normal loadings on these lines. The field levels for the new GREC line are based on a current of 500-amperes, which is the maximum anticipated plant output.
†Corresponds to the edge of the right-of-way abutting the railroad right-of-way.
‡These standard field levels are established in Rule 62-814.450(3), F.A.C. 230-kV standards apply to 138-kV facilities.

Sources: EzEMF software program developed through Florida Electric Power Coordinating Group and accepted by FDEP.
Zachry, 2009.
GREC, 2009.

magnetic field strengths indicative of the switchyard, EMF analysis was performed using EzEMF software for two cross-sections running under the lines at the point of exit under maximum loading conditions. Figure 9.5.5-1 illustrates the locations of those two cross-sections. It should be noted that the switchyard lies within a GRU parcel carved out of a much larger GREC-owned property. There is no public access anywhere within either parcel. From the results of the EMF analysis, it can be concluded that electric and magnetic field strengths at the closest point of public access are well below statutory requirements of 2 kilovolts per meter (kV/m) and 150 milliGauss (mG), respectively.

Table 9.5.5-1 presents the maximum EMF that can be produced by the proposed transmission line and switchyard under maximum operating conditions. These fields comply with FDEP rule requirements for new 230-kV lines or smaller. Appendix 10.9 provides data depicting the maximum electric and magnetic fields at maximum operating conditions for each of the typical line configurations, both on the right-of-way and laterally under the transmission line and for the property boundary of the switchyard.

In the event additional configurations are required by the detailed design of the transmission line after certification, GREC LLC will submit the EMF compliance demonstrations to FDEP at least 90 days prior to the start of construction.

9.5.5.2 Audible Noise

Audible noise calculations were not performed for this project due to the small voltage and the fact that the transmission line is wholly contained on GREC or GRU power plant property. It is expected that other daily operating noises from the GREC and DGS plant facilities and traffic noise from nearby U.S. 441 would mask any audible noise from the operation of the transmission line.

9.5.5.3 Safety

GREC's transmission line facilities are designed to comply with all applicable codes, guidelines, and standards. The primary code used in the design of transmission lines is the NESC 2007 edition. The NESC is an ANSI standard that covers electrical clearances and loading and strength requirements, including extreme wind. Codes and standards of

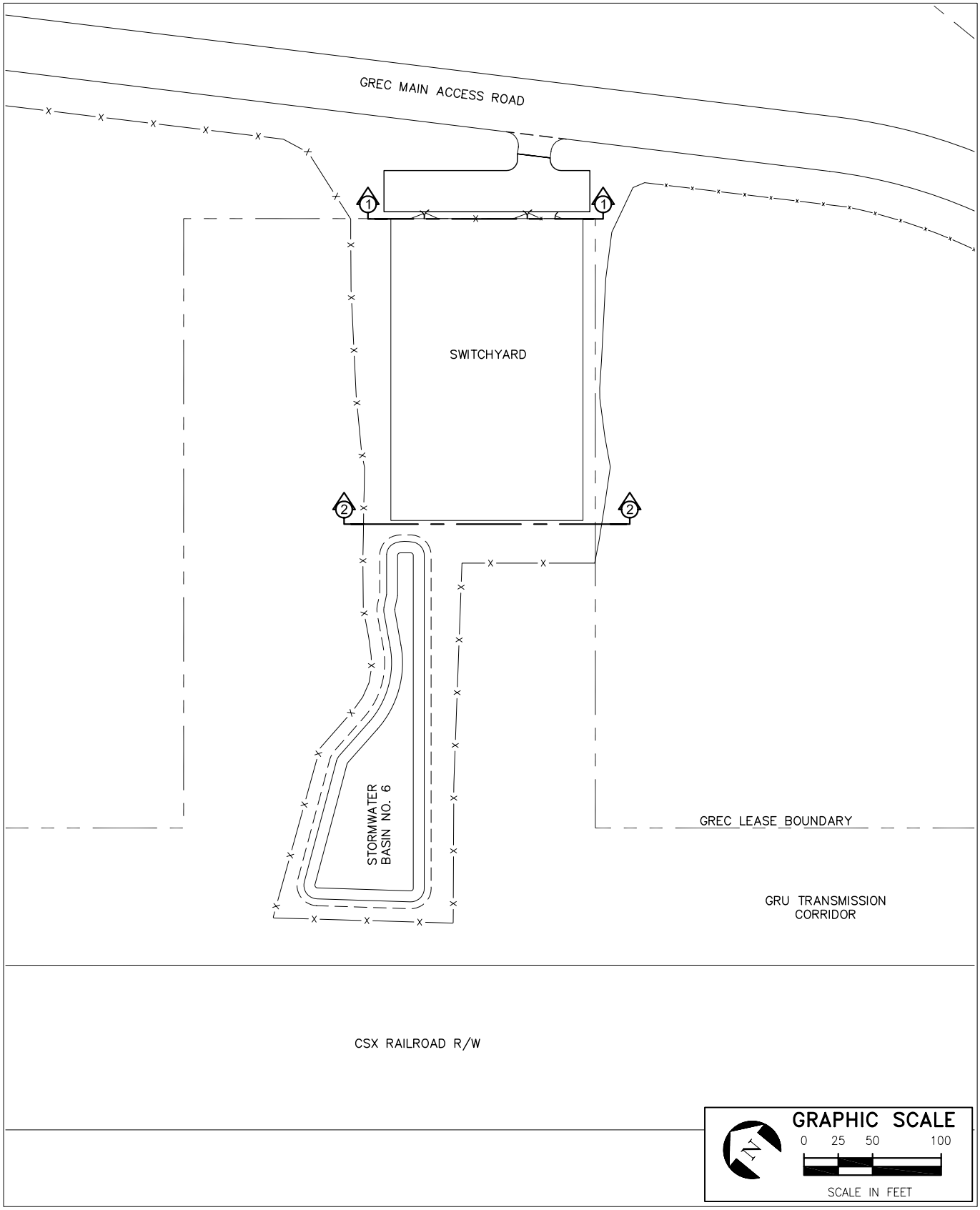

FIGURE 9.5.5-1.

LOCATION OF EMF CROSS-SECTIONS

Source: EDA, 2009; ECT, 2009.

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other agencies and standard-setting organizations that provide rules, guidelines, and conditions for particulars not specified by the NESC used to design the proposed transmission line include:

- OSHA rules provide requirements for safe minimum approach distances.
- American Society of Civil Engineers (ASCE) Manual 74, Guidelines for Electrical Transmission Line Structural Loading, and Standard 48-05, Design of Steel Transmission Pole Structures.
- FDOT 2007 Utility Accommodation Manual.

These codes, guidelines, and standards provide design parameters and guidelines with the goal of protecting public safety.