7.0 AIR QUALITY IMPACT ANALYSIS METHODOLOGY

7.1 GENERAL APPROACH

As previously noted in Section 3.1, GREC will be located in an area designated attainment or unclassifiable for all criteria pollutants. All areas of Florida, with the exception of four PSD Class I areas, are designated as PSD Class II areas. Accordingly, the GREC Site and vicinity are classified as a PSD Class II area. This section focuses on the methodology used to determine project air quality impacts with respect to the PSD Class II increments and the NAAQS.

Florida PSD Class I areas include the Everglades National Park and the Chassahowitzka, St. Marks, and Bradwell Bay National Wilderness Areas. GREC air quality impacts with respect to PSD Class I areas are addressed in Section 11.0.

The approach to assessing air quality impacts for a new or modified emission source generally begins by determining the impacts of only the proposed facility. If facility impacts are below the PSD SILs, then no further analysis is required. The PSD Class II SILs were previously presented in Table 3-4. If the impacts of a proposed facility are found to exceed a particular PSD SIL, further analysis considering other existing sources and background pollutant concentrations is required. With the exception of PM_{10}, GREC impacts are predicted to be below the PSD SILs. Accordingly, an analysis of PSD increments and NAAQS was only required for PM_{10}.

The approach used to analyze the potential impacts from the facility, as described in detail in the following subsections, was developed in accordance with applicable federal and state laws and related guidelines. Guidance contained in EPA manuals and user's guides was sought and followed. In addition, an air dispersion modeling protocol was submitted to FDEP in July 2009 for review and comments. The air quality impact analyses conducted for the facility incorporates the comments and suggestions received from FDEP and EPA Region 4 on the modeling protocol. Appendix C contains the proposed modeling protocol and FDEP and EPA comments.

7.2 POLLUTANTS EVALUATED

Based on an evaluation of anticipated worst-case annual operating scenarios, GREC will have the potential to emit 418.1 tpy of NO_x, 715.6 tpy of CO, 130.4 tpy of PM, 281.2 tpy of PM_{10}, 243.9 tpy of SO_2, 78.1 tpy of VOCs, and 5.9 tpy of H_2SO_4 mist. Table 3-2 previously provided the estimated potential annual emission rates for GREC. As shown in that table, potential emissions of NO_x, CO, VOC, PM, PM_{10}, and SO_2 are each projected to exceed the applicable PSD significant emission rates. In accordance with current EPA policy, PM_{10} was used as a surrogate for $PM_{2.5}$. Potential GREC emissions are below the applicable PSD significant emission rates for all other regulated pollutants.

GREC is subject to the PSD air quality impact analysis requirements for NO_x (as NO_2), CO, SO_2, and PM_{10}. There are no applicable AAQS or PSD increments for PM and VOC, and, therefore, air quality impact analyses are not required for these pollutants.

7.3 MODEL SELECTION AND USE

For this air quality analyses, the current version of the refined American Meteorological Society (AMS)/EPA regulatory model (AERMOD) modeling system (Version 09292—October 19, 2009), together with 5 years of hour-by-hour National Weather Service (NWS) meteorological data, was used to predict short-term periods (i.e., periods equal to or less than 24 hours) and annual average air quality impacts. Two BFB boiler operational cases (i.e., 70- and 100-percent load) were modeled for each pollutant/averaging period and each year of meteorological data.

Regulatory agency recommended procedures for conducting air quality impact assessments are contained in the EPA's GAQM. In the November 9, 2005, Federal Register (F.R.), EPA approved use of AERMOD as a GAQM Appendix A *preferred* model effective December 9, 2005. AERMOD is recommended for use in a wide range of regulatory applications, including both simple and complex terrain. The AERMOD modeling system consists of meteorological and terrain preprocessing programs (AERMET and AERMAP, respectively), and the AERMOD dispersion model.

7.4 MODEL OPTIONS

Procedures applicable to the AERMOD modeling system specified in the latest version of the User's Guide for the AMS/EPA Regulatory Model—AERMOD (September 2004, currently under revision), the October 2009 Addendum to the User's Guide, and the current GAQM were followed. In addition, guidance from the EPA AERMOD Implementation Guide (updated March 19, 2009) was applied. In particular, the AERMOD control pathway MODELOPT keyword parameters DFAULT and CONC were selected. Selection of the parameter DFAULT, which specifies use of the regulatory default options, is recommended by the GAQM. The CONC option specifies the calculation of concentrations. GREC will be located in an area of Alachua County that is mostly rural with some commercial and industrial use. Accordingly, AERMOD options pertinent to urban areas including increased surface heating (URBANOPT keyword) and pollutant exponential decay (HALFLIFE and DCAYCOEF keywords) were not employed. In addition, the option to use flagpole receptors (FLAGPOLE keyword) was not selected. As previously mentioned, the AERMOD modeling system was used to determine short-term and annual average impacts by using the PERIOD parameter for the AVERTIME keyword.

7.5 NO_2 AMBIENT IMPACT ANALYSIS

For annual NO_2 impacts, the tiered screening approach described in the GAQM, Section 5.2.4, was used. Tier 1 of this screening procedure assumes complete conversion of NO_x to NO_2. Tier 2 applies an empirically derived NO_2/NO_x ratio of 0.75 to the Tier 1 results.

7.6 TERRAIN CONSIDERATION

The GAQM defines *flat* terrain as terrain equal to the elevation of the stack base, *simple* terrain as terrain lower than the height of the stack top, and *complex* terrain as terrain exceeding the height of the stack being modeled. AERMOD contains algorithms for estimating air quality impacts in flat, simple, and complex terrain.

The elevation of GREC is approximately 185 feet above mean sea level (ft-msl). The GREC BFB boiler stack will have a height of 230 feet above ground level (ft-agl). Accordingly, terrain elevations above 415 ft-msl would be classified as complex terrain. USGS National Elevation Dataset/Shuttle Radar Topography Mission (NED/SRTM) terrain data in geo-referenced tagged image file format (GeoTIFF) were examined for terrain features within the GREC impact area. The topography in the vicinity of GREC is mostly flat. Terrain elevations within 15 km of the project site range from 43.5 to 198.5 ft-msl. Based on this examination, terrain in the vicinity of the Site is classified as flat and simple terrain.

In accordance with the latest GAQM recommendations for AERMOD, each modeled receptor was assigned a terrain elevation based on USGS NED/SRTM data and the AERMAP (Version 09040—February 9, 2009) terrain preprocessing program. AERMAP was used in accordance with the latest version of the User's Guide for the AERMOD Terrain Preprocessor (AERMAP), addenda to the User's Guide, and EPA's GAQM.

7.7 BUILDING WAKE EFFECTS

The CAA Amendments require the degree of emission limitation required for control of any pollutant not be affected by a stack height that exceeds good engineering practice (GEP) or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (40 CFR 51). GEP stack heights for the facility emission sources will comply with EPA promulgated final stack height regulations (40 CFR 51). GEP stack height is defined as the highest of 65 meters (213 ft), or a height established by applying the formula:

$$Hg = H + 1.5\,L$$

where: Hg = GEP stack height.

H = height of the structure or nearby structure.

L = lesser dimension (height or projected width) of the nearby structure.

Nearby is defined as a distance up to five times the lesser of the height or width dimension of a structure or terrain feature, but not greater than 800 meters (2,625 ft). While

GEP stack height regulations require that stack height used in modeling for determining compliance with NAAQS and PSD increments not exceed the GEP stack height, the actual stack height may be greater. Guidelines for determining GEP stack height have been issued by EPA (1985).

The height proposed for the BFB boiler stack (230 ft-agl) is greater than the maximum regulatory GEP stack height of 213 ft (65 meters). However, based on the height of the boiler (i.e., 180 ft-agl), the BFB boiler stack will be less than GEP as defined by the formula. Since the proposed BFB boiler stack height will comply with the EPA promulgated final stack height regulations and will also comply with applicable Federal Aviation Authority (FAA) requirements, it was used in the modeling analyses.

While the GEP stack height rules address the maximum stack height that can be employed in a dispersion model analysis, a stack having a height lower than GEP stack height can potentially result in higher downwind concentrations due to building downwash effects. AERMOD evaluates the effects of building downwash based on the Plume Rise Model Enhancements (PRIME) building downwash algorithms. For the ambient impact analysis, the downwash analysis implemented by AERMOD was performed using the current version of EPA's Building Profile Input Program (BPIP) for PRIME (BPIPPRM—Version 04274 [September 30, 2004]). The EPA BPIPPRM program was used to determine the area of influence for each building, whether a particular stack is subject to building downwash, the area of influence for directionally dependent building downwash, and finally to generate the specific building dimension data required by the model. BPIPPRM output consists of an array of 36 direction-specific (10° to 360°) building heights (BUILDHGT keyword), lengths (BUILDLEN keyword), widths (BUILDWID keyword), and along-flow (XBADJ keyword) and across-flow (YBADJ keyword) distances for the stack suitable for use as input to AERMOD.

Table 7-1 provides dimensions of the buildings/structures evaluated for wake effects. The building/structure dimensions were determined from engineering layouts and specifications. Figure 7-1 shows the buildings/structures in three dimensions.

Table 7-1. Building and Structure Dimensions

Building/Structure	Modeling ID	Height		Length		Width	
		ft	meter	ft	meter	ft	meter
Boiler tier 1	BLD_14T1	179.0	54.6	87.6	26.7	90.2	27.5
Boiler tier 2	BLD_14T2	115.0	35.1	35.4	10.8	90.2	27.5
Truck receiving	BLD_58	54.0	16.5	26.3	8.0	54.9	16.7
Cooling tower	BLD_9	50.0	15.2	60.1	18.3	241.3	73.5
Raw water/firewater tank	BLD_17	50.0	15.2	70.2*	21.4*	—	—
Water treatment and pad	BLD_5	45.0	13.7	49.4	15.1	64.4	19.6
Baghouse PDC	BLD_23	70.0	21.3	60.7	18.5	137.8	42.0
Hog/screen structure	BLD_29	77.0	23.5	50.0	15.2	66.1	20.2
Warehouse	BLD_3	40.0	12.2	62.3	19.0	115.0	35.0
Control room/office	BLD_21	30.0	9.1	49.3	15.0	99.8	30.4
Fire pumps	BLD_20	55.0	16.8	15.4	4.7	49.3	15.0
Steam turbine	BLD_8	40.0	12.2	53.7	16.4	109.6	33.4
Fuel day bins structure	BLD_13	60.0	18.3	47.7	14.5	89.3	27.2
Sorbent silo	67_SORBENT	45.0	13.7	14.1*	4.3*	—	—
Fly ash silo	BLD_22	70.0	21.3	20.0*	6.1*	—	—
Sawdust storage pile	65_SAWDUST	12.0	3.7	211.6	64.5	134.2	40.9
Fuel storage 2	64_FUELSTRG2	35.0	10.7	459.3	140.0	416.7	127.0
Fuel storage 1	50_FUELSTRG1	85.0	25.9	393.7	120.0	393.7	120.0
Stock pile # 1	44_STCKPILE1	60.0	18.3	120*	36.6*	—	—

*Dimension represents structure diameter

Source: ECT, 2009.

FIGURE 7-1.
BUILDING/STRUCTURE THREE DIMENSIONAL VIEW

Source: Zachry, 2009; ECT, 2009.

Gainesville Renewable Energy Center
An American Renewables Company

7.8 RECEPTOR GRIDS

Receptors were placed at locations considered to be ambient air, which is defined as "that portion of the atmosphere, external to buildings, to which the general public has access." The entire perimeter of the GREC leased Site will be fenced. Therefore, the nearest locations of general public access are at the facility fence lines. Consistent with GAQM recommendations, the ambient impact analysis used the following receptor grids:

- Fence Line Receptors—Receptors placed on the site fence line spaced 50 meters apart.
- Near-Field Cartesian Receptors—Receptors at 100-meter spacing beyond the fence line extending to approximately 3 km.
- Mid-Field Cartesian Receptors—Receptors at 500-meter spacing extending to approximately 6 km.
- Far-Field Cartesian Receptors—Receptors at 1,000-meter spacing extending to approximately 15 km.

The origin of the above Cartesian receptor grids was located at the approximate center of GREC. Following initial modeling of the BFB boiler, it was determined that maximum impacts will occur within 1 km of the boiler stack. For the assessment of GREC PM_{10} impacts, a Cartesian receptor grid centered on the GREC power block area with a 100-meter spacing extending to 2 km was employed. The full receptor grid was used to evaluate the GREC CO impacts.

As noted previously, the AERMOD results demonstrate that GREC air quality impacts will be below the PSD SILs for all pollutants and averaging times with the exception of PM_{10}. Accordingly, a receptor grid consisting of the specific GREC emission source receptors that exceeded the PSD Class II PM_{10} SILs was developed. This grid included any receptor for which an SIL was exceeded for any averaging time, year, or set of meteorological data. These PM_{10} SIL exceedance receptor grids were subsequently used for the cumulative PM_{10} PSD Class II increment and NAAQS analyses.

Graphical representations of the receptor grids are provided as follows:

- Figure 7-2. Fence Line Receptors.
- Figure 7-3. Near- to Far-Field Receptors (fence line to 15 km).
- Figure 7-4. Refined 2-km Receptor Grid (GREC PM_{10} sources).
- Figure 7-5. PM_{10} SIL Receptor Grid.

7.9 METEOROLOGICAL DATA

The EPA AERMET and AERSURFACE meteorological data preprocessing programs were used to generate the meteorological input files required by AERMOD.

The AERMET meteorological preprocessing program creates two files that are used by AERMOD (i.e. surface and profile files). The surface file contains boundary layer parameters including friction velocity, Monin-Obukhov length, convective velocity scale, temperature scale, convectively generated boundary layer (CBL) height, stable boundary layer (SBL) height, and surface heat flux. The profile file contains multilevel data of windspeed, wind direction, and temperature.

AERMET passes all observed meteorological parameters to AERMOD, including wind direction and speed (at multiple heights, if available), temperature, and, if available, measured turbulence. AERMOD uses this information to calculate concentrations in a manner that accounts for a dispersion rate that is a continuous function of meteorology. The current EPA-approved version of AERMET (Version 06341 – December 7, 2006) was used in accordance with the latest version (November) (EPA, 2004c) of the *User's Guide for the AERMOD Meteorological Preprocessor (AERMET)*, addenda to the User's Guide (EPA, 2006c), and EPA's GAQM.

The AERMET meteorological processor requires the determination of three surface characteristics: surface roughness length (z_o), albedo (r), and Bowen ratio (B_o). Surface roughness length is related to the height of obstacles to the wind flow and is the height at which the mean horizontal wind speed is zero based on a logarithmic profile. Surface roughness length influences the surface shear stress and is an important factor in

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

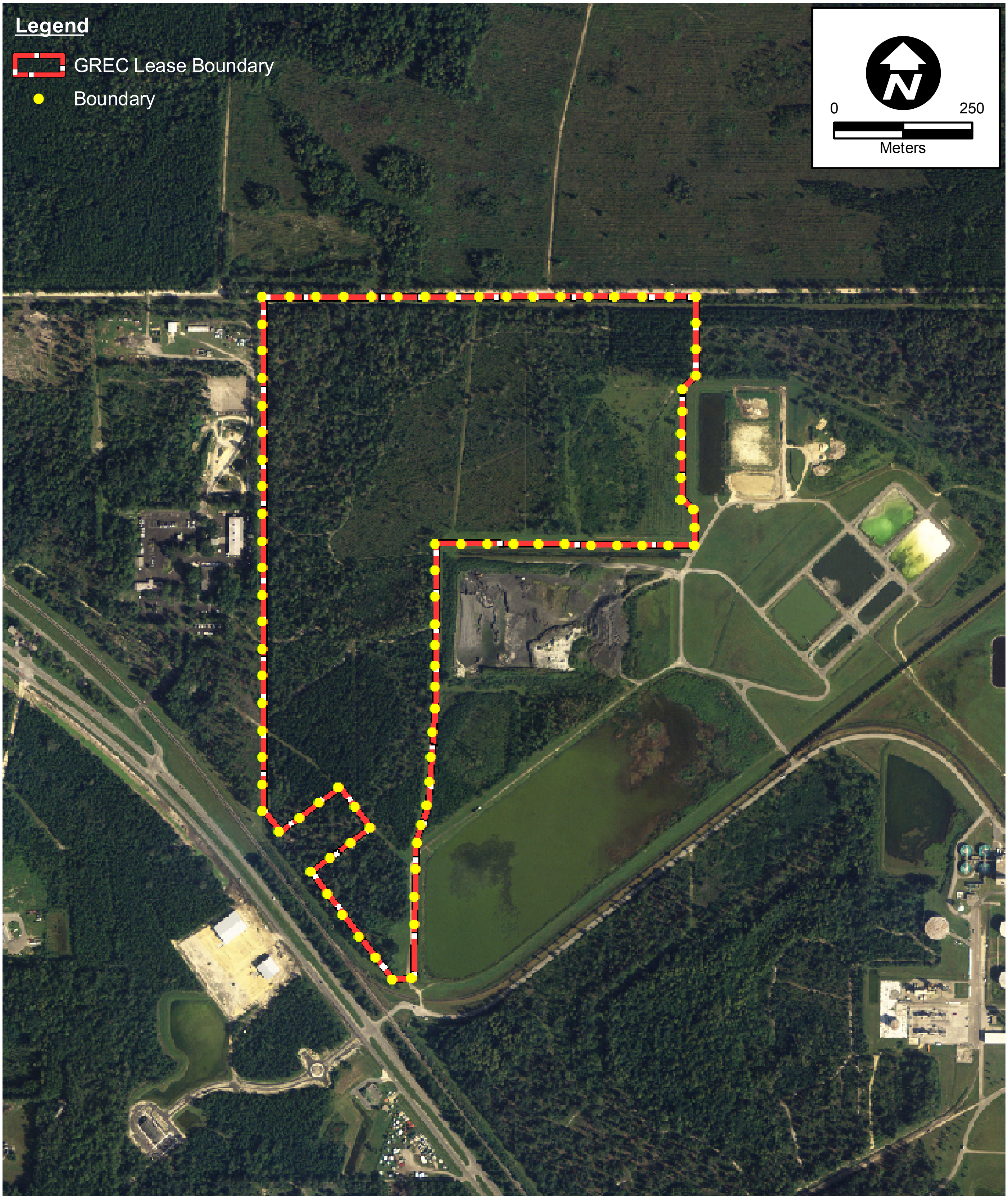

FIGURE 7-2.

FENCE LINE RECEPTOR GRID

Sources: NRCS, 2007; ECT, 2009,

Gainesville Renewable Energy Center
An American Renewables Company

File: M:\acad\090408\ReceptorGrid_15km.mxd

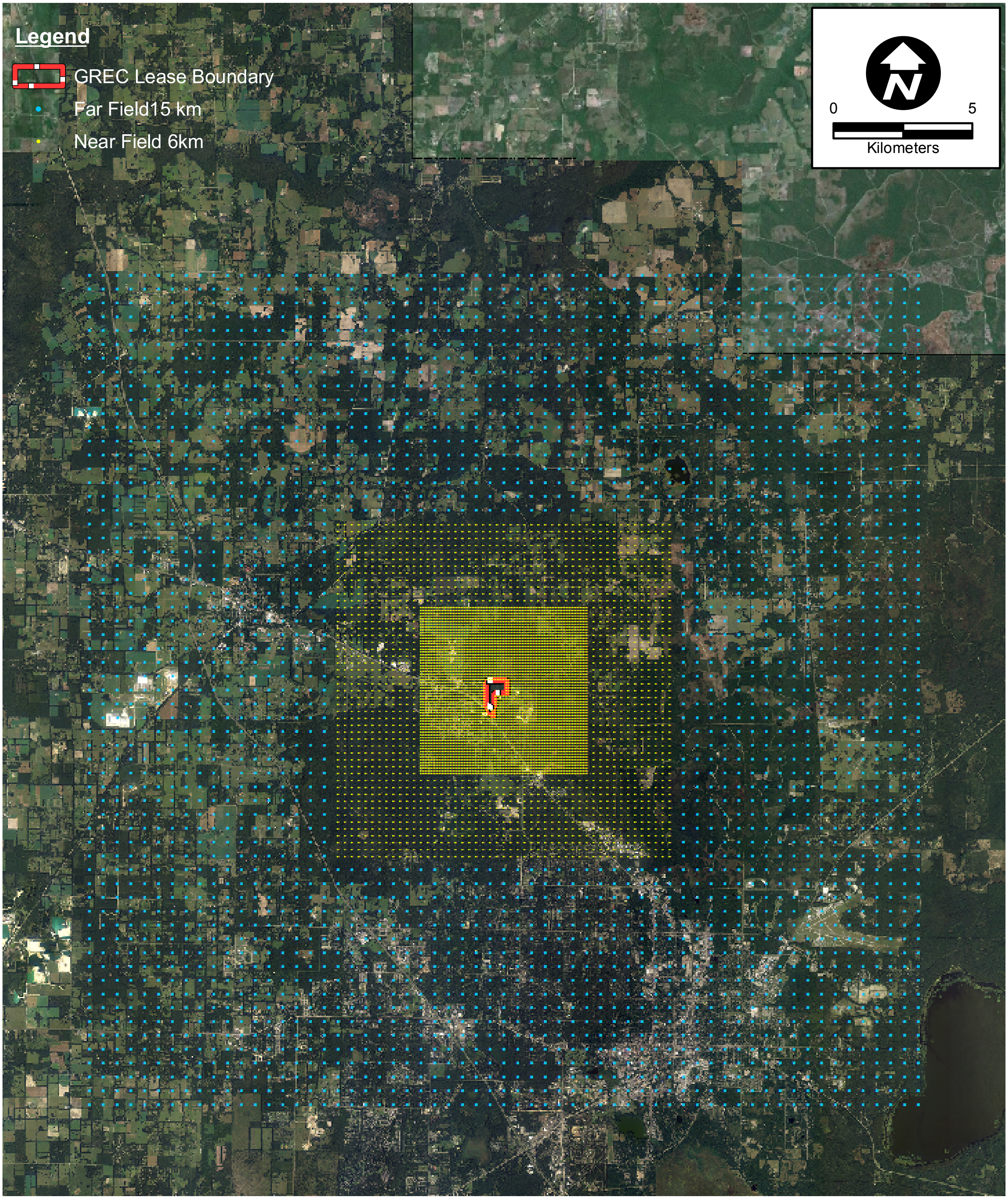

FIGURE 7-3.

NEAR AND FAR FIELD RECEPTOR GRIDS

Sources: NRCS, 2007; ECT, 2009,

Gainesville Renewable Energy Center
An American Renewables Company

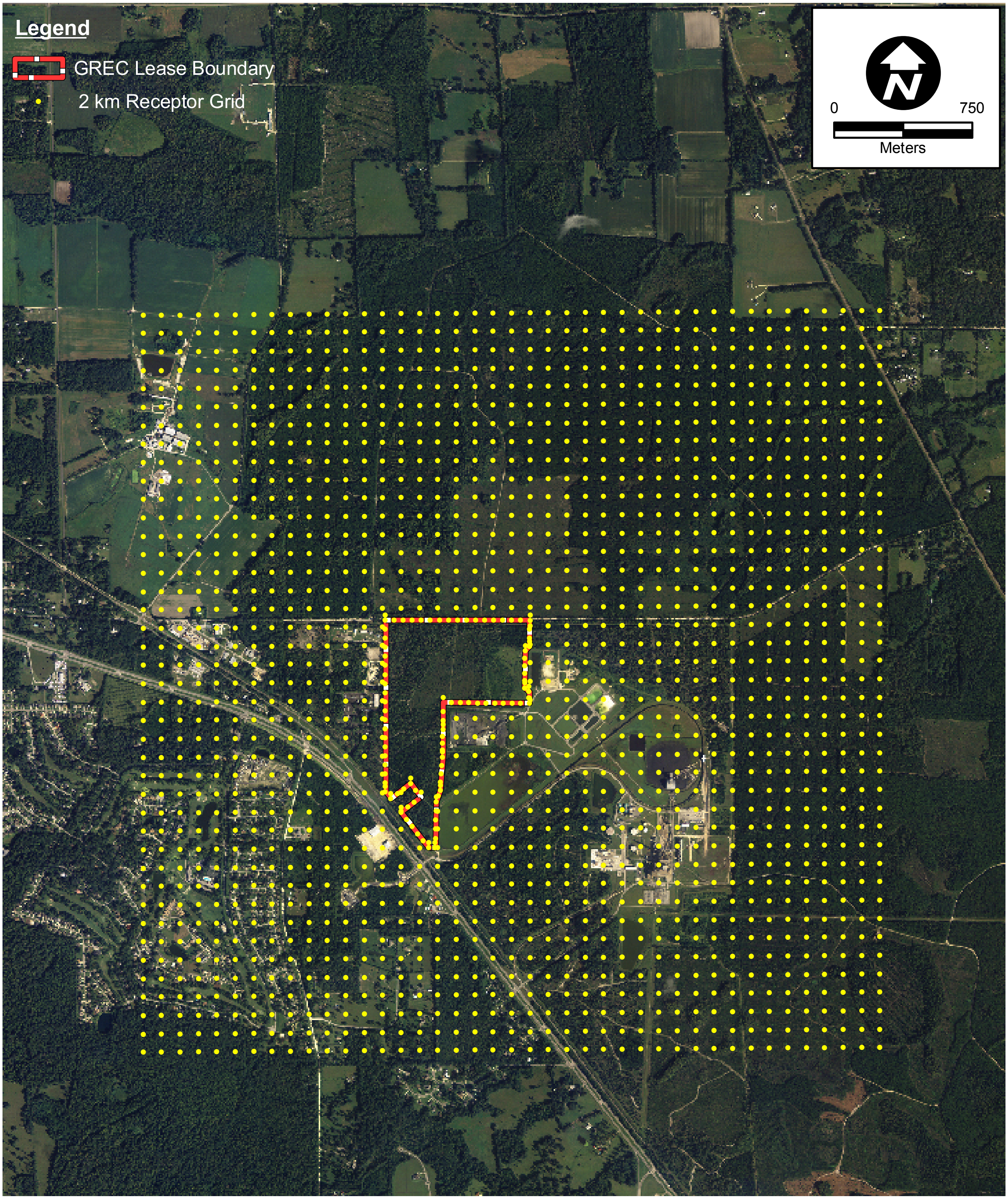

FIGURE 7-4.

2 km RECEPTOR GRID

Sources: NRCS, 2007; ECT, 2009,

Gainesville Renewable Energy Center
An American Renewables Company

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

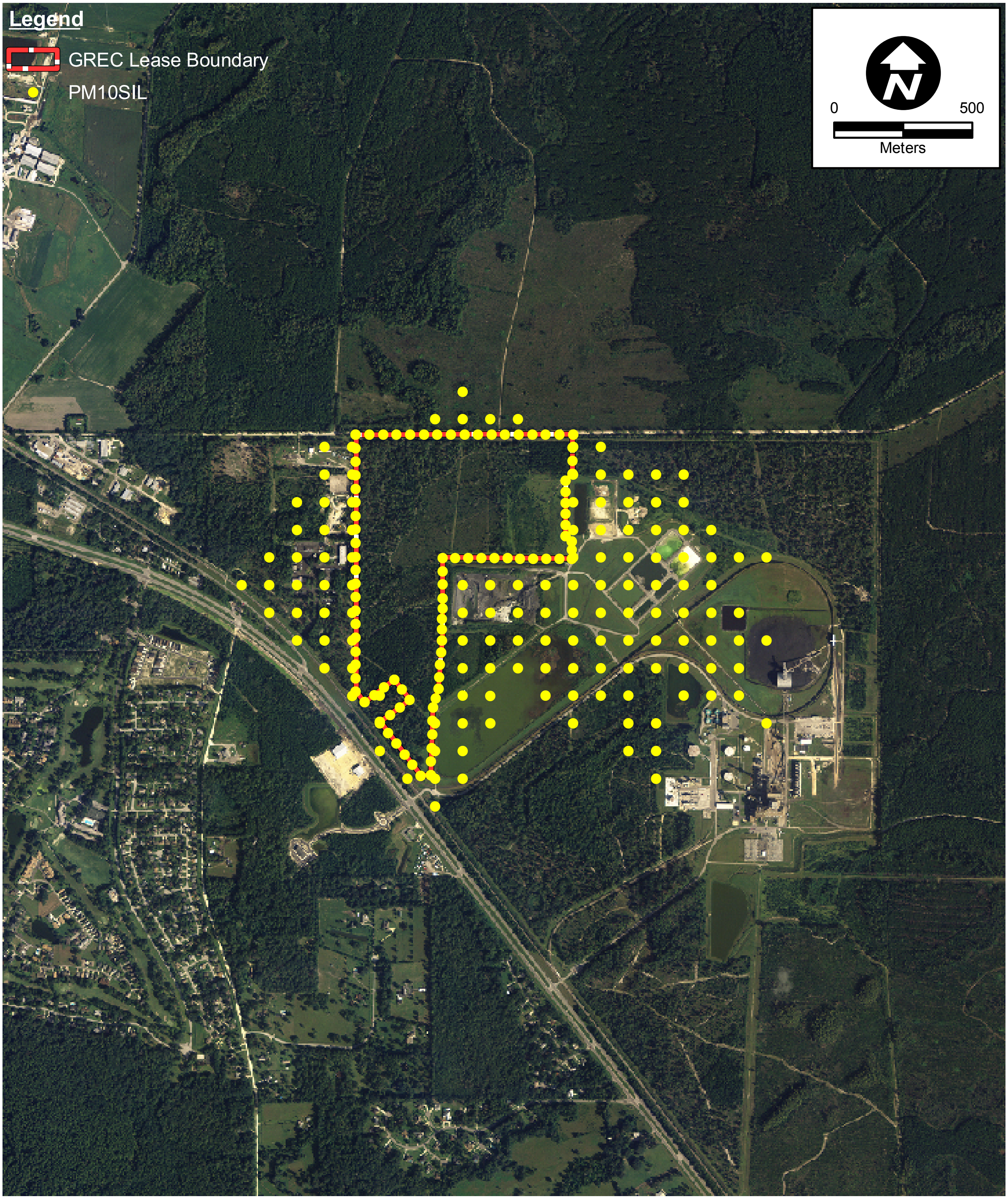

FIGURE 7-5.

PM10 SIL RECEPTOR GRID

Sources: NRCS, 2007; ECT, 2009,

Gainesville Renewable Energy Center
An American Renewables Company

determining the magnitude of mechanical turbulence and the stability of the boundary layer. Albedo is the fraction of total incident solar radiation reflected by the surface back to space without absorption. The daytime Bowen ratio, an indicator of surface moisture, is the ratio of sensible heat flux to latent heat flux and, together with albedo and other meteorological observations, is used for determining planetary boundary layer parameters for convective conditions driven by the surface sensible heat flux. The EPA AERSURFACE program was developed to aid users in obtaining realistic and reproducible surface characteristic values, including albedo, Bowen ratio, and surface roughness length, for input to AERMET. The program uses publicly available national land cover datasets and look-up tables of surface characteristics that vary by land cover type and season. The current EPA-approved version of AERSURFACE (Version 08009 – January 9, 2008) was used in accordance with the latest version (January 2008) of the *AERSURFACE User's Guide*, updates to the User's Guide, and EPA's GAQM.

AERSURFACE contains a set of seasonal surface characteristics which are based on data reported in the literature. Values of seasonal surface characteristics were developed for the continental U.S. for the following five seasonal categories:

- Midsummer with lush vegetation.
- Autumn with un-harvested cropland.
- Late autumn after frost and harvest, or winter with no snow.
- Winter with continuous snow on ground.
- Transitional spring with partial green coverage or short annuals.

These categories are the same as those used by AERMOD for the model's gas deposition algorithms. The user is given the option of assigning specific calendar months to each seasonal category based on site-specific factors. If this option is selected, AERSURFACE will generate monthly or annual surface characteristics for input to AERMET. This option allows for a better evaluation of site-specific surface characteristics compared to the AERSURFACE defaults. For processing the GREC north-central Florida meteorological data, calendar months were assigned to the five seasonal categories as follows.

- Due to short seasonal transition periods in the spring and fall, the months of March and April were assigned to seasonal category 5, and the months of October and November were assigned to seasonal category 2.
- The summer season in north-central Florida is relatively long, starting earlier in the year and ending later than in most of the continental United States. Therefore, the months of May, June, July, August, and September were assigned to seasonal category 1, thus extending the summer season category.
- The months of December, January, and February were assigned to seasonal category 3.
- Since north-central Florida does not experience any periods of winter with continuous snow on the ground, none of the months were assigned to seasonal category 4.

The nearest source of surface meteorological data is the NWS site (Weather-Bureau-Army-Navy [WBAN] Station No. 12816) located at the Gainesville Regional Airport (GRA) approximately 10 miles southeast of GREC. The nearest source of upper air meteorological data is the NWS site (WBAN Station No. 13889) located at the Jacksonville International Airport (JIA) approximately 66 miles northeast of GREC. Based on the proximity of GRA and JIA meteorological stations and in accordance with FDEP guidance, the most recent 5 years (i.e., 2001 through 2005) of readily available surface and upper air meteorological data from GRA and JIA were selected for the GREC air quality impact analysis.

Since surface characteristics influencing dispersion within 1 km of the GRA meteorological station differ from GREC, two sets of meteorological data were prepared for use in the model. Each dataset contains 5 consecutive years (i.e., 2001 through 2005) of GRA surface and JIA upper air meteorological data. The first set used the surface characteristics of the GRA site (see Table 7-2), while the second set employed GREC surface characteristics (see Table 7-3). Figures 7-6 and 7-7 provide aerial views of the GRA and GREC Site, respectively. Both 5-year sets of GRA/JIA meteorological data, in

Table 7-2. Summary of Seasonal AERMET Surface Characteristics for GRA

	Winter			Spring			Summer			Fall		
Sectors	Albedo	Bowen Ratio	Surface Roughness	Albedo	Bowen Ratio	Surface Roughness	Albedo	Bowen Ratio	Surface Roughness	Albedo	Bowen Ratio	Surface Roughness
1	0.14	0.63	0.101	0.14	0.51	0.126	0.14	0.37	0.148	0.14	0.61	0.134
2	0.14	0.63	0.195	0.14	0.51	0.221	0.14	0.37	0.257	0.14	0.61	0.242
3	0.14	0.63	0.472	0.14	0.51	0.514	0.14	0.37	0.561	0.14	0.61	0.549
4	0.14	0.63	1.186	0.14	0.51	1.201	0.14	0.37	1.201	0.14	0.61	1.201
5	0.14	0.63	1.049	0.14	0.51	1.072	0.14	0.37	1.078	0.14	0.61	1.078
6	0.14	0.63	1.093	0.14	0.51	1.103	0.14	0.37	1.105	0.14	0.61	1.105
7	0.14	0.63	1.143	0.14	0.51	1.159	0.14	0.37	1.196	0.14	0.61	1.196
8	0.14	0.63	0.894	0.14	0.51	0.907	0.14	0.37	0.938	0.14	0.61	0.938
9	0.14	0.63	1.166	0.14	0.51	1.173	0.14	0.37	1.182	0.14	0.61	1.182
10	0.14	0.63	0.237	0.14	0.51	0.28	0.14	0.37	0.32	0.14	0.61	0.304
11	0.14	0.63	0.048	0.14	0.51	0.068	0.14	0.37	0.085	0.14	0.61	0.075
12	0.14	0.63	0.041	0.14	0.51	0.056	0.14	0.37	0.07	0.14	0.61	0.06

Source: ECT, 2009.

Table 7-3. Summary of Seasonal AERMET Surface Characteristics for GREC

	Winter			Spring			Summer			Fall		
Sectors	Albedo	Bowen Ratio	Surface Roughness	Albedo	Bowen Ratio	Surface Roughness	Albedo	Bowen Ratio	Surface Roughness	Albedo	Bowen Ratio	Surface Roughness
1	0.14	0.69	1.252	0.14	0.49	1.261	0.14	0.36	1.261	0.14	0.65	1.261
2	0.14	0.69	1.274	0.14	0.49	1.277	0.14	0.36	1.277	0.14	0.65	1.277
3	0.14	0.69	1.122	0.14	0.49	1.128	0.14	0.36	1.128	0.14	0.65	1.128
4	0.14	0.69	0.37	0.14	0.49	0.382	0.14	0.36	0.435	0.14	0.65	0.435
5	0.14	0.69	0.429	0.14	0.49	0.432	0.14	0.36	0.439	0.14	0.65	0.439
6	0.14	0.69	0.166	0.14	0.49	0.167	0.14	0.36	0.17	0.14	0.65	0.17
7	0.14	0.69	0.925	0.14	0.49	0.934	0.14	0.36	0.947	0.14	0.65	0.947
8	0.14	0.69	0.743	0.14	0.49	0.771	0.14	0.36	0.793	0.14	0.65	0.793
9	0.14	0.69	0.715	0.14	0.49	0.806	0.14	0.36	0.87	0.14	0.65	0.87
10	0.14	0.69	0.86	0.14	0.49	0.886	0.14	0.36	0.91	0.14	0.65	0.91
11	0.14	0.69	1.084	0.14	0.49	1.103	0.14	0.36	1.148	0.14	0.65	1.148
12	0.14	0.69	1.211	0.14	0.49	1.226	0.14	0.36	1.226	0.14	0.65	1.226

Source: ECT, 2009.

FIGURE 7-6.

AERIAL VIEW OF GAINESVILLE REGIONAL AIRPORT

Sources: SJRWMD, 2007; ECT, 2009.

Gainesville Renewable Energy Center
An American Renewables Company

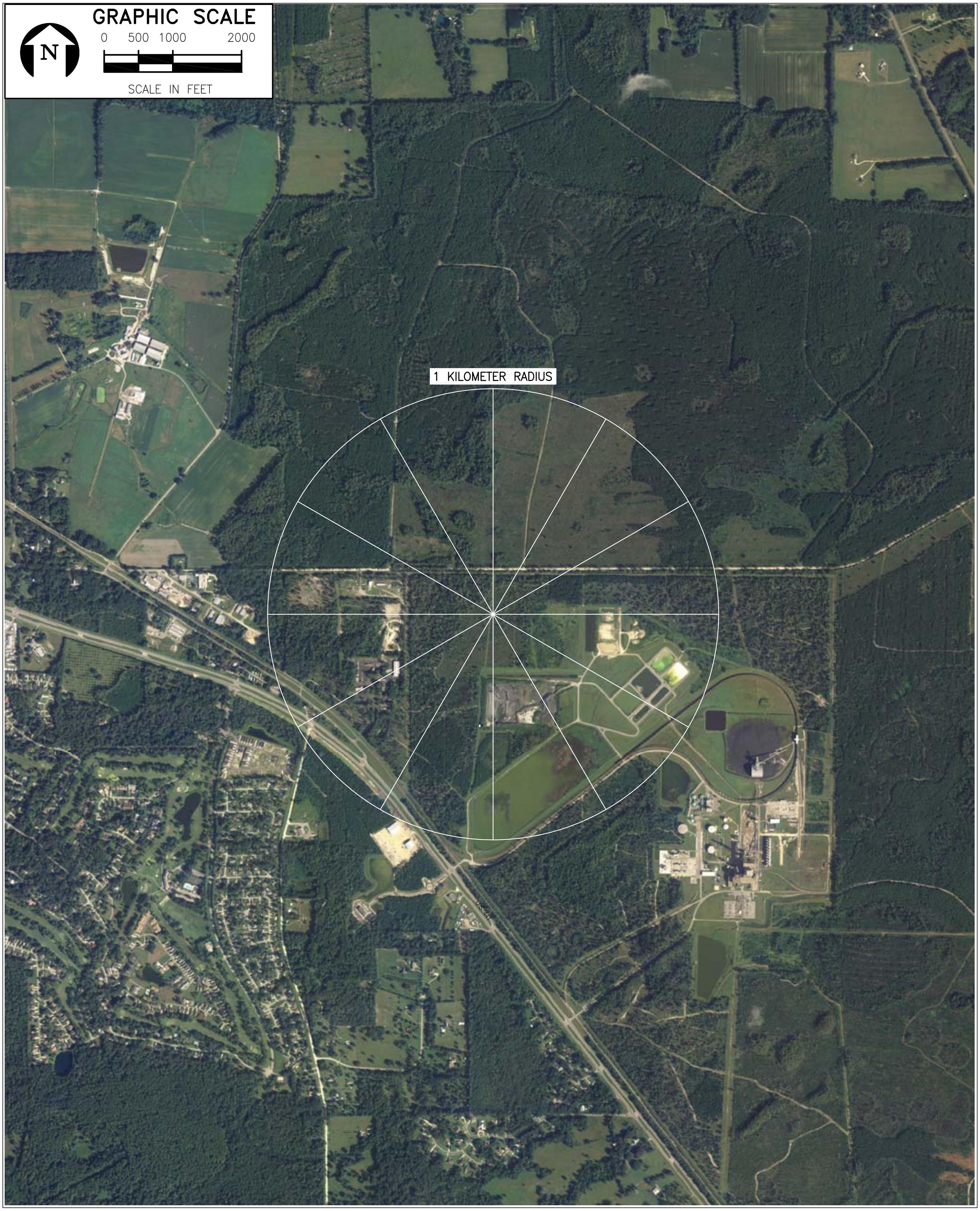

FIGURE 7-7.

AERIAL VIEW OF GREC SITE

Sources: SJRWMD, 2007; ECT, 2009.

Gainesville Renewable Energy Center
An American Renewables Company

conjunction with the AERMOD dispersion model, were used to determine maximum GREC air quality impacts.

7.10 <u>MODELED EMISSION INVENTORY</u>

7.10.1 ON-PROPERTY SOURCES

GREC emission sources addressed in the air quality impact analysis include the BFB boiler, material handling point emission sources (i.e., baghouses), mechanical draft cooling tower, emergency diesel engines, and fugitive emission sources associated with material handling and truck traffic roadway emissions. The BFB boiler and emergency diesel engines will emit pollutants associated with fuel combustion. The remaining GREC emission sources will all emit only PM_{10}.

All GREC emissions sources were assessed for PM_{10} impacts. For evaluating NO_x and SO_2 impacts, detailed modeling was only performed for the BFB boiler stack. While the emergency diesel engines also emit these pollutants, the engines will operate infrequently (up to 96 hr/yr for routine testing and maintenance) and will combust ULSD fuel oil. Accordingly, emergency diesel engine annual average NO_2 and SO_2 impacts will be insignificant. Short-term SO_2 impacts will also be insignificant due to the low SO_2 emission rates resulting from the use of ULSD fuel oil; e.g., the emergency generator diesel engine maximum SO_2 emission rate is only 0.0078 lb/hr. When operated for routine testing and maintenance, the emergency diesel engines may operate for a period of up to 2 hours in a 24-hour period. Accordingly, assessment of GREC CO impacts included the emergency diesel engines as well as the BFB boiler.

The BFB boiler, material handling sources equipped with baghouses, cooling tower, and emergency diesel engines were modeled as point sources. Excluding startups and shutdowns, the BFB boiler will operate between 70 and 100 percent of full load. Emissions from the BFB boiler will decrease with reduced load. However, the BFB boiler exhaust flow rate and stack exit velocity will also decrease. The interaction of these two variables could potentially result in higher impacts at reduced boiler load. Accordingly, the BFB boiler was modeled at the minimum (70 percent) and maximum (100 percent) steadystate operating loads. The locations, stack parameters, and emissions rates for the GREC point sources were previously provided in Section 2.0 of this report.

The fugitive PM_{10} material transfer points and plant roadway truck traffic were modeled as volume sources. The initial dispersion parameters associated with the volume sources were based on the physical dimensions of structures at the transfer point or, in the case of the roadways, on the dimensions of the trucks in conjunction with the turbulence produced by their movement. The roadways were depicted in the model as a series of nonadjacent volume sources. The volume source locations and emission rates were previously provided in Section 2.0 of this report.

7.10.2 OFF-PROPERTY SOURCES

Since PM_{10} impacts from GREC were predicted to exceed the SILs, interactive modeling including other offsite sources was performed to demonstrate compliance with the NAAQS and PSD Class II increments. FDEP supplied a list of industrial sources within 60 km of GREC. In addition to the source locations, the list included other useful information including source description, annual and short-term emission rates, and stack parameters. The FDEP list was supplemented with permit information obtained from FDEP's air permit documents search Web site www.dep.state.fl.us/air/emission/apds /default.asp.

It is regulatory agency policy to include all off-property sources within a radius of 50 km from the maximum distance to any significant receptor. Since the maximum distance to significance is less than 10 km, including off-property sources within a 60-km radius is conservative. In addition, the entire NAAQS inventory was conservatively used for both the NAAQS analysis and the PSD increment analysis; i.e., all sources were assumed to consume PSD increment. To reduce the number of other sources included in the modeling, only sources reasonably expected to significantly impact the SIA were selected. A screening procedure, commonly referred to as the North Carolina 20D Rule, was used. The first step in this procedure is to multiply the distance (D) of the source from the edge of the SIA in km by 20 to obtain the value 20D. This defines the threshold value in tpy for each pollutant being studied. Facilities with emissions below 20D are assumed to not be able to contribute significantly within the SIA and are eliminated from the inventory. The complete list of facilities and the results of the 20D screening procedure are shown in Table 7-4. Even though the SIA for PM_{10} was found to be less than 10 km, all sources within 10 km of GREC were included in the modeling, and 10 km was subtracted from the total distance to the source to define the value for D. Also, only stack emissions were included in the inventory, because fugitive PM_{10} emissions from distant sources would not be expected to impact significantly within the SIA. In addition, it was possible to eliminate sources not having numerical emission limits; i.e., sources whose particulate emissions are controlled by a visible emissions limit.

There were 18 facilities included in the FDEP list for which PM_{10} emissions rate data were missing and for which additional information could not be located in the FDEP permit documents database. Since it is believed that major sources having PSD and Title V permits are likely to be included in FDEP's permit database, the 14 facilities with missing information and 20D thresholds greater than 100 tpy were felt to be good candidates for elimination; i.e., none of those facilities were likely to have potential PM_{10} emissions greater than 100 tpy. The Milam Funeral crematorium facility had a 20D threshold of 91.2 tpy. Since it is unlikely that this facility would exceed this threshold, it was also eliminated. Three facilities that did not have available permit information were within 10 km of GREC. Two of the facilities incinerate animal remains, and the third has two natural gas-fired boilers. None of these facilities are expected to have significant PM_{10} impacts.

Table 7-5 contains the emissions and stack parameters of the sources that were selected to be included in the modeling. Figure 7-8 shows the location of the off-property facilities that were selected for modeling. Following are notes concerning sources of the facilities that were included in the inventory:

- J.R. Kelly Generating Station—Emissions Unit 9 consists of three unregulated combustion turbines and was not included in the modeling since there are no numerical emission rates.

Table 7-4. Selection of Off-Property Sources for Inclusion in Cumulative PM_{10} Modeling

Facility ID	Owner/Company Name—Site Name	East UTM (km)	North UTM (km)	Distance from GREC (km)	Assumed Edge of PM_{10} SIA (km)	Distance from Edge of SIA (km)	Threshold Emissions $PM_{10} \times 20D$ (tpy)	Potential PM_{10} Emissions (tpy)	Modeling Required (Yes/No)
10001	Florida Power Corp D/B/A Progress—UF Cogen	368.78	3,279.25	14.44	10.00	4.44	88.70	13.10	No
10002	Escalade Sports—Fred Bear Archery Equipment	365.71	3,276.50	17.23	10.00	7.23	144.60	29.93	No
10003	Koppers Industries, Inc.	371.70	3,283.30	12.68	10.00	2.68	53.60	48.00	No
10005	Gainesville Regional Utilities—John R. Kelly Power Plant	372.05	3,280.05	15.11	10.00	5.11	102.10	468.00	Yes
10006	Gainesville Regional Utilities—Deerhaven Generating Station	365.81	3,292.88	1.35	10.00	-8.65	—	697.00	Yes
10007	Maddox Foundry and Machine Works, Inc.	352.40	3,267.30	27.99	10.00	17.99	359.80	6.53	No
10013	Cemex—Gainesville Concrete Readymix Plant	370.20	3,279.00	15.66	10.00	5.66	113.20	14.13	No
10037	V.E. Whitehurst and Sons, Inc.	368.75	3,288.80	6.26	10.00	-3.75	—	53.30	Yes
10039	Lamson and Sessions Co.	347.00	3,299.60	18.78	10.00	8.78	175.60	VE only	No
10040	Electro Energy Florida LLC	361.49	3,294.78	3.56	10.00	-6.44	—	NA	No
10041	N. Fla/South Ga Veterans Health System—Gainesville	369.75	3,279.13	15.38	10.00	5.38	107.60	7.76	No
10056	Central Florida Crematorium, aka Milam Funeral	371.80	3,280.30	14.56	10.00	4.56	91.20	NA	No
10057	Forest Meadows Funeral Home, Inc.	371.40	3,283.80	11.20	10.00	1.20	24.00	3.50	No
10061	Florida Rock Industries Inc—High Springs	359.30	3,289.65	17.57	10.00	7.57	151.30	NA	No
10062	University of Florida—Animal Resources Department	369.93	3,279.39	14.82	10.00	4.82	96.40	3.74	No
10064	Southern Pre-Cast, Inc.	359.00	3,295.70	6.17	10.00	-3.83	—	VE only	No
10069	Specialty Construction Brands, Inc.	369.50	3,287.10	8.04	10.00	-1.96	—	10.90	Yes
10070	Williams Colonial Crematory	371.65	3,282.13	12.81	10.00	2.81	56.20	1.24	No
10072	University of Florida Biotechnology Development Institute	355.30	3,295.50	9.74	10.00	-0.26	—	NA	No
10073	Sanvik Minning and Construction LLC USA	355.70	3,295.20	9.29	10.00	-0.71	—	<1.0	No
10087	Florida Rock Industries, Inc.—Thompson S. Baker Cement Plant	347.69	3,286.54	19.94	10.00	9.94	198.79	805.44	Yes
10103	Cherished Memories Inc.	356.84	3,296.35	9.83	10.00	-0.17	—	NA	No
10116	Alachua County Animal Services	375.71	3,286.57	13.05	10.00	3.05	61.00	1.38	No
10118	Electro Energy Florida, LLC	361.40	3,294.80	3.56	10.00	-6.44	—	VE only	No
10125	Crevasse's Pet Cremation Service —Gainesville	369.68	3,287.45	7.14	10.00	-2.86	—	1.47	Yes
10127	Florida Septic, Inc./ Hawthorne Plant	397.31	3,274.30	37.85	10.00	27.85	557.00	NA	No
30001	Northeast Florida State Hospital	391.00	3,345.00	57.24	10.00	47.24	944.80	13.50	No
30004	Insteel Wire Products Inc.—Insteel Wire Products Florida	378.91	3,347.19	55.48	10.00	45.48	909.60	1.78	No
30010	Hanson Roof Tile—Sanderson Facility	379.20	3,347.20	55.38	10.00	45.38	907.60	10.56	No
70001	E.I. Dupont De Nemours and Company, Inc.—Highland	398.39	3,325.00	45.52	10.00	35.52	710.30	19.20	No
70004	Griffin Industries of Florida—Test3	391.66	3,306.06	28.49	10.00	18.49	369.75	10.93	No
70011	Florida Rock Industries, Inc.—Bradford	393.10	3,313.10	34.27	10.00	24.27	485.40	NA	No
70012	Florida Gas Transmission Company—Bradford County Station #16	371.98	3,310.57	17.93	10.00	7.93	158.60	9.36	No
70016	Owen Joist Corporation—SMI Joist of Florida	391.80	3,309.75	30.42	10.00	20.42	408.40	0.73	No
190005	Gilman Building Products Company	400.90	3,336.20	55.80	10.00	45.80	916.00	13.72	No
190011	E.I. Dupont De Nemours and Company—Trailridge	400.19	3,308.70	37.87	10.00	27.87	557.45	19.20	No
190059	W.W.Carter Contracting—Contractmasters Road Property	414.37	3,324.69	57.66	10.00	47.66	953.20	VE only	No
230008	Purina Mills, Inc.	341.20	3,341.40	53.42	10.00	43.42	868.40	VE only	No
230026	Columbia Ready Mix Concrete, Inc.	341.60	3,342.90	54.56	10.00	44.56	891.20	NA	No
230032	Forest Lawn Memorial Gardens	342.91	3,332.65	45.61	10.00	35.61	712.20	NA	No

Table 7-4. Selection of Off-Property Sources for Inclusion in Cumulative PM_{10} Modeling (Continued, Page 2 of 2)

Facility ID	Owner/Company Name—Site Name	East UTM (km)	North UTM (km)	Distance from GREC (km)	Assumed Edge of PM_{10} SIA (km)	Distance from Edge of SIA (km)	Threshold Emissions $PM_{10} \times 20D$ (tpy)	Potential PM_{10} Emissions (tpy)	Modeling Required (Yes/No)
230035	Timco—Lake City Airport	348.30	3,339.00	48.93	10.00	38.93	778.60	VE only	No
230039	Trinity Materials LLC—Plant #37	341.30	3,343.55	55.99	10.00	45.99	919.80	3.47	No
230040	Columbia Block, Inc.	343.24	3,343.06	54.70	10.00	44.70	894.00	NA	No
230043	Bluelinx Corporation	346.52	3,339.35	49.95	10.00	39.95	799.00	31.90	No
410001	Bell Concrete Products, Inc.	319.60	3,294.90	45.23	10.00	35.23	704.60	NA	No
410004	Florida Gas Transmission Company—Station 24, Trenton	321.31	3,282.79	46.59	10.00	36.59	731.70	5.37	No
750001	Trinity Materials, LLC—Williston Concrete Batch Plant	362.81	3,250.80	43.15	10.00	33.15	663.00	NA	No
750026	Bell Concrete Products, Inc.	318.06	3,266.04	53.74	10.00	43.74	874.80	NA	No
750028	Trinity Materials LLC—Plant #38	314.70	3,272.30	54.49	10.00	44.49	889.80	4.98	No
750030	Knauff Crematory	318.98	3,262.26	57.12	10.00	47.12	942.40	NA	No
750085	Freebee Landholdings, Ltd.—Watson Construction Borrow Pit	349.00	3,264.60	33.95	10.00	23.95	479.00	29.10	No
830016	Franklin Industrial Minerals/Lowell	384.54	3,244.15	53.07	10.00	43.07	861.35	11.16	No
830017	Mfm Industries Inc.—Lowell Processing Plant	384.50	3,245.30	51.91	10.00	41.91	838.20	50.40	No
830059	Steven Counts, Inc. Asphalt Plant #1	385.02	3,237.05	59.90	10.00	49.90	998.00	51.74	No
830069	Delta Laboratories—Ocala	385.00	3,238.00	59.38	10.00	49.38	987.60	VE only	No
830091	Dixie Lime and Stone—Cummer Limestone Mine	386.70	3,238.00	59.55	10.00	49.55	991.00	NA	No
1070001	Feldspar Corp—Edgar Plastic Kaolin Division	408.11	3,273.43	46.86	10.00	36.86	737.20	38.96	No
1070007	Florida Rock Industries, Inc.—Keuka Plant	411.30	3,274.20	50.30	10.00	40.30	806.00	NA	No
1070015	Georgia-Pacific Wood Products LLC—Hawthorne Plywood Plant	399.60	3,273.80	39.92	10.00	29.92	598.40	180.00	No
1210465	Suwannee American Cement Company	321.40	3,315.90	50.39	10.00	40.39	807.80	384.91	No
1250005	Gilman Building Products Company	373.50	3,319.70	27.48	10.00	17.48	349.60	24.36	No
1250007	Pride Enterprises—Union Metal	384.90	3,326.60	38.59	10.00	28.59	571.80	VE only	No
7770007	Anderson Columbia, Inc.—Asphalt Plant #9	400.30	3,275.50	38.89	10.00	28.89	577.80	10.10	No
7770037	Apac-Southeast, Inc.—First Coast Division	393.62	3,303.85	29.44	10.00	19.44	388.80	22.01	No
7770079	White Construction Company—Gainesville Asphalt Plant	347.00	3,299.80	18.87	10.00	8.87	177.40	8.98	No
7770123	Trinity Materials, LLC—Plant #35	344.80	3,282.00	24.59	10.00	14.59	291.80	2.11	No
7770130	Venkat's Test Site	362.61	3,272.88	21.17	10.00	11.17	223.40	NA	No
7770237	Anderson Mining Corporation	321.00	3,316.00	49.18	10.00	39.18	783.60	NA	No
7775074	Anderson Columbia Company, Inc.—Panhandle Land and Timber Plant #12	342.40	3,344.26	56.16	10.00	46.16	923.20	11.17	No
7775181	Trinity Materials, LLC—Concrete Plant No. 5	401.70	3,334.20	54.81	10.00	44.81	896.20	11.94	No
7775240	Apac-Se, Inc. First Coast Division—Gainesville Asphalt Plant	368.17	3,288.88	5.81	10.00	-4.20	—	3.94	Yes
7775271	John C. Hipp Construction Equipment Company	361.20	3,296.50	10.19	10.00	0.19	3.80	42.63	Yes
7775304	Trinity Materials, LLC—Temporary Plant at Newberry	344.70	3,282.20	24.58	10.00	14.58	291.60	2.02	No

Note: Distance to facilities was measured from central GREC location; i.e., UTM 3293.865 km north and UTM 364.888 km east.

Source: ECT, 2009.

Table 7-5. Off-Property Source Inventory Modeling Parameters

Facility ID	Emission Unit Description	Model ID	East UTM (meter)	North UTM (meter)	Source Elevation (meter)	PM_{10} Emission Rate		Stack Height		Exit Temperature		Exit Velocity		Stack Diameter	
						lb/hr	g/s	ft	meter	°F	K	ft/s	m/s	ft	meter
Gainesville Regional Utilities—John R. Kelly Power Plant															
10005	Fossil Fuel-Fired Steam Generator Unit No. 7	Kelly_7	372,100	3,280,100	44.20	27.20	3.43	200	61.0	337	443	40.0	12.19	10.5	3.20
10005	Combined-Cycle Unit No. 1 (CC-1)	Kelly_10	372,000	3,280,000	44.20	10.00	1.26	102	31.1	242	390	62.2	18.96	15.5	4.72
Gainesville Regional Utilities—Deerhaven Generating Station															
10006	Fossil Fuel Fired Steam Generator No. 1	Deer_3	365,789	3,292,851	56.08	96.00	12.10	300	91.4	261	400	47.0	14.33	11.0	3.35
10006	Fossil Fuel Fired Steam Generator No. 2	Deer_5	365,813	3,292,881	56.39	242.80	30.59	350	106.7	275	408	50.0	15.24	18.5	5.64
10006	Simple Cycle Comb Turbine No. 3	Deer_6	365,532	3,292,921	54.86	15.00	1.89	52	15.8	1,100	866	168.0	51.21	14.1	4.30
V. E. Whitehurst & Sons, Inc.															
10037	#4 Asphalt Plant with Baghouse	White_3	368,700	3,289,000	57.61	12.17	1.53	31	9.4	300	422	98.6	30.05	3.8	1.17
Specialty Construction Brands, Inc.															
10069	Motar and Grout Plant - Processes and 7 Silo Dust Collectors	SCB_1	369,500	3,287,100	56.08	8.71	1.10	69	21.0	80	300	50.0	15.24	0.5	0.15
Crevasse's Pet Cremation Service—Gainesville															
10125	Pet Crematory	Crev-1	369,680	3,287,450	56.08	0.33	0.04	15	4.6	1,300	978	18.2	5.55	1.5	0.46
Florida Rock Industries, Inc. —Thompson S. Baker Cement Plant															
10087	Kiln/Raw Mill System Stack	Baker_3	348,350	3,287,040	25.60	22.10	2.78	250	76.2	356	453	47.8	14.57	9.4	2.87
10087	Clinker Cooler and Handling	Baker_4	348,350	3,287,040	25.60	13.00	1.64	115	35.1	480	522	41.9	12.77	9.0	2.74
10087	Raw Mill System—Line 2	Baker_9	346,360	3,285,640	25.60	2.51	0.32	240	73.2	200	366	46.7	14.23	2.6	0.80
10087	Kiln/Raw Mill—Line 2	Baker_10	346,430	3,285,690	25.60	25.00	3.15	315	96.0	356	453	52.6	16.03	9.4	2.87
10087	Clinker Handling System—Line 2	Baker_11	348,350	3,287,040	25.60	10.84	1.37	198	60.4	480	522	45.1	13.75	9.0	2.74
10087	Finish Grinding Operation—Line 2	Baker_12	346,530	3,285,670	25.60	10.16	1.28	131	39.9	158	343	48.3	14.72	7.5	2.29
10087	Cement Loadout Silos 6 and 7	Baker_13	346,660	3,285,770	25.60	0.15	0.02	30	9.1	150	339	28.3	8.63	1.5	0.46
10087	Coal/Coke Handling and Grinding Operation	Baker_14	346,480	3,285,730	25.60	1.27	0.16	198	60.4	150	339	6.3	1.92	9.0	2.74
APRAC - Southeast, Inc. First Coast Div.— Gainesville Asphalt Plant															
7775240	Double Barrel Drum Mix Asphalt Plant	GAP_1	368,150	3,288,960	58.52	9.20	1.16	31	9.4	0	255	0.003	0.001	3.05	1.00
John C. Hipp Construction Equipment Company															
7775271	Drum Mix Asphalt Plant	Hipp_1	356,700	3,296,500	25.60	9.48	1.19	32	9.8	0	255	69.4	21.15	4.1	1.25

Source: ECT, 2009.

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

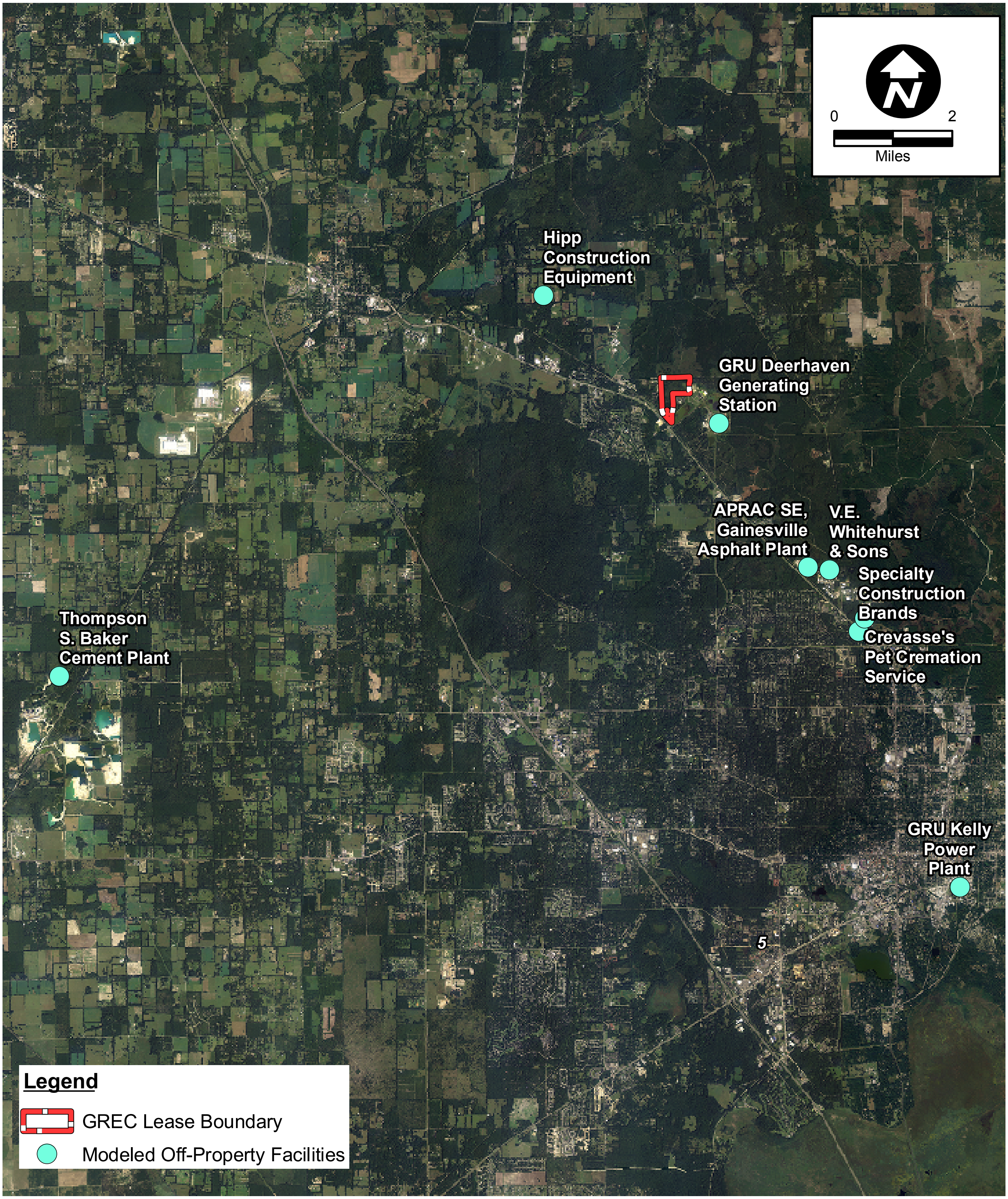

FIGURE 7-8.

LOCATION OF MODELED OFF-PROPERTY PM_{10} FACILITIES

Sources: NRCS, 2007; ECT, 2009,

Gainesville Renewable Energy Center
An American Renewables Company

- Deerhaven Generating Station—The two small 20-MW, simple-cycle combustion turbines 1 and 2 were eliminated from the inventory because they are unregulated sources and emissions or stack data were unavailable. Also, the fugitive emissions (EUs 7 and 8) were not included in the modeling.
- V.E. Whitehurst & Sons, Inc.—Emissions Unit 3 was retained for modeling. The stack emissions were based on the NSPS limit of 0.04 gr/dscf.
- Specialty Construction Brands, Inc.—Stack parameters were only available for the silo filters. Emissions from the seven silos account for approximately 30 percent of the potential hourly emissions. To be conservative, all emissions were summed and modeled using the height and flow rate of the silo filters.
- Crevasse's Pet Cremation Service—The hourly emission rate of the incinerator was based on the flow rate and permit limit of 0.08 gr/dscf.
- Thompson S. Baker Cement Plant—The fugitive emission sources (EUs 1, 5, 6, 7, 8, and 15) were not included in the modeling. Emissions Unit 2 was also eliminated since its emissions are vented to Emissions Unit 3 and are included in that way.
- APAC, Gainesville Asphalt Plant—Emissions Unit 1 was retained for modeling. The stack emissions were based on the NSPS limit of 0.04 gr/dscf.
- John C. Hipp Construction Equipment Company—Emissions Unit 1 was retained for modeling. The stack emissions were based on the NSPS limit of 0.04 gr/dscf.