8.0 AMBIENT IMPACT ANALYSIS RESULTS

8.1 OVERVIEW

Comprehensive dispersion modeling was conducted to assess the air quality impacts resulting from GREC operations in accordance with the methodology described in Section 7.0. This section provides the results of the air quality assessment with respect to PSD Class II area impacts. GREC air quality impacts at the distant PSD Class I areas resulting from long-range transport are addressed in Section 11.0.

8.1 RESULTS

8.1.1 PSD SIGNIFICANT IMPACT LEVEL ANALYSIS

As discussed in Section 7.2, GREC is subject to the PSD air quality impact analysis requirements for NO_x (as NO_2), CO, SO_2, and PM_{10}. The first step in the PSD Class II area analysis was to determine the air quality impacts for these pollutants due to only the GREC emission sources for comparison to the PSD Class II area SILs. Except for low levels of emissions from the emergency diesel engines, the BFB boiler is the principle GREC emission source for SO_2, NO_x, and CO. Therefore, the impact of the BFB boiler alone was evaluated by running AERMOD for each load (i.e., 100- and 70-percent load conditions), each year of meteorology (i.e., 2001 through 2005), and each option for processing the meteorological data (i.e., use of GRA or GREC site characteristics). Normalized concentrations were produced using a 10-g/s emission rate for the BFB boiler stack and proportioning the results based on the potential emission rate for each pollutant. Tables 8-1 through 8-4 provide the results of this analysis of the BFB boiler. As shown on these tables, the predicted impacts of SO_2, NO_x, CO, and PM_{10} are below the SILs for all averaging times.

Tables 8-5 through 8-8 present details of the maximum BFB boiler impacts that occurred for each modeled year for SO_2 and NO_2. These tables include the maximum air quality impacts for all meteorological data and BFB boiler loads evaluated, location and relative position of these impacts to GREC, time period that the impacts occurred, and comparisons of the impacts to the PSD SILs. In addition, the maximum impacts were compared

Table 8-1. PSD Class II SIL Analysis Summary—BFB Boiler at 100-Percent Load: GRA Surface Characteristics

	Year of Meteorology 2001	2002	2003	2004	2005	Maximum Impact ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceed SIL? (Yes/No)
Nominal 10 g/s Impacts:								
High, 1-hour ($\mu g/m^3$)	11.36	11.34	10.92	11.66	11.77			
High, 3-hour ($\mu g/m^3$)	7.16	6.69	7.40	7.83	7.47			
High, 8-hour ($\mu g/m^3$)	5.29	5.44	5.81	6.56	6.08			
High, 24-hour ($\mu g/m^3$)	2.51	3.02	2.90	3.36	4.00			
Annual ($\mu g/m^3$)	0.38	0.39	0.44	0.39	0.34			
SO_2								
Emission rate (g/s)	7.02	7.02	7.02	7.02	7.02			
High, 3-hour ($\mu g/m^3$)	5.02	4.70	5.19	5.50	5.24	5.50	25	No
High, 24-hour ($\mu g/m^3$)	1.76	2.12	2.04	2.36	2.81	2.81	5	No
Annual ($\mu g/m^3$)	0.27	0.27	0.31	0.27	0.24	0.31	1	No
NO_x								
Emission rate (g/s)	11.98	11.98	11.98	11.98	11.98			
Tier 1 annual ($\mu g/m^3$)*	0.45	0.47	0.53	0.46	0.41	0.53	1	No
Tier 2 annual ($\mu g/m^3$)†	0.34	0.35	0.39	0.35	0.31	0.39	1	No
CO								
Emission rate (g/s)	20.54	20.54	20.54	20.54	20.54			
High, 1-hour ($\mu g/m^3$)	23.33	23.29	22.43	23.95	24.17	24.17	2,000	No
High, 8-hour ($\mu g/m^3$)	10.86	11.18	11.93	13.47	12.49	13.47	500	No
PM_{10}								
Emission rate (g/s)	7.18	7.18	7.18	7.18	7.18			
High, 24-hour ($\mu g/m^3$)	1.80	2.17	2.08	2.41	2.87	2.87	5	No
Annual ($\mu g/m^3$)	0.27	0.28	0.31	0.28	0.25	0.31	1	No

*Assumes total conversion of NO to NO_2.
†Tier 1 impact multiplied by national default NO_2/NO_x ratio of 0.75.

Source: ECT, 2009.

Table 8-2. PSD Class II SIL Analysis Summary—BFB Boiler at 100-Percent Load: GREC Site Surface Characteristics

	Year of Meteorology 2001	2002	2003	2004	2005	Maximum Impact ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceed SIL? (Yes/No)
Nominal 10 g/s Impacts:								
High, 1-hour ($\mu g/m^3$)	9.49	9.17	9.28	9.25	9.06			
High, 3-hour ($\mu g/m^3$)	7.11	7.14	6.93	8.02	7.25			
High, 8-hour ($\mu g/m^3$)	5.52	5.69	6.13	6.96	6.20			
High, 24-hour ($\mu g/m^3$)	3.42	2.91	4.19	3.73	4.66			
Annual ($\mu g/m^3$)	0.39	0.43	0.41	0.37	0.38			
SO_2								
Emission rate (g/s)	7.02	7.02	7.02	7.02	7.02			
High, 3-hour ($\mu g/m^3$)	4.99	5.01	4.86	5.63	5.09	5.63	25	No
High, 24-hour ($\mu g/m^3$)	2.40	2.04	2.94	2.62	3.27	3.27	5	No
Annual ($\mu g/m^3$)	0.27	0.30	0.29	0.26	0.26	0.30	1	No
NO_x								
Emission rate (g/s)	11.98	11.98	11.98	11.98	11.98			
Tier 1 annual ($\mu g/m^3$)*	0.47	0.51	0.49	0.44	0.45	0.51	1	No
Tier 2 annual ($\mu g/m^3$)†	0.35	0.38	0.37	0.33	0.34	0.38	1	No
CO								
Emission rate (g/s)	20.54	20.54	20.54	20.54	20.54			
High, 1-hour ($\mu g/m^3$)	19.49	18.83	19.06	19.00	18.61	19.49	2,000	No
High, 8-hour ($\mu g/m^3$)	11.34	11.69	12.59	14.28	12.73	14.28	500	No
PM_{10}								
Emission rate (g/s)	7.18	7.18	7.18	7.18	7.18			
High, 24-hour ($\mu g/m^3$)	2.46	2.09	3.01	2.68	3.35	3.35	5	No
Annual ($\mu g/m^3$)	0.28	0.31	0.30	0.26	0.27	0.31	1	No

*Assumes total conversion of NO to NO_2.
†Tier 1 impact multiplied by national default NO_2/NO_x ratio of 0.75.

Source: ECT, 2009.

Table 8-3. PSD Class II SIL Analysis Summary—BFB Boiler at 70-Percent Load: GRA Surface Characteristics

	Year of Meteorology					Maximum Impact ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceed SIL? (Yes/No)
	2001	2002	2003	2004	2005			
Nominal 10 g/s Impacts:								
High, 1-hour ($\mu g/m^3$)	15.44	15.84	15.44	15.68	16.33			
High, 3-hour ($\mu g/m^3$)	10.83	8.62	9.80	10.16	10.48			
High, 8-hour ($\mu g/m^3$)	6.79	6.92	7.89	8.46	8.05			
High, 24-hour ($\mu g/m^3$)	3.24	3.72	3.75	4.46	4.95			
Annual ($\mu g/m^3$)	0.51	0.52	0.59	0.53	0.47			
SO_2								
Emission rate (g/s)	4.91	4.91	4.91	4.91	4.91			
High, 3-hour ($\mu g/m^3$)	5.32	4.24	4.82	4.99	5.15	5.32	25	No
High, 24-hour ($\mu g/m^3$)	1.59	1.83	1.84	2.19	2.43	2.43	5	No
Annual ($\mu g/m^3$)	0.25	0.25	0.29	0.26	0.23	0.29	1	No
NO_x								
Emission rate (g/s)	8.39	8.39	8.39	8.39	8.39			
Tier 1 annual ($\mu g/m^3$)*	0.43	0.43	0.50	0.44	0.39	0.50	1	No
Tier 2 annual ($\mu g/m^3$)†	0.32	0.33	0.37	0.33	0.30	0.37	1	No
CO								
Emission rate (g/s)	14.38	14.38	14.38	14.38	14.38			
High, 1-hour ($\mu g/m^3$)	22.20	22.77	22.20	22.54	23.48	23.48	2,000	No
High, 8-hour ($\mu g/m^3$)	9.76	9.95	11.34	12.16	11.57	12.16	500	No
PM_{10}								
Emission rate (g/s)	5.03	5.03	5.03	5.03	5.03			
High, 24-hour ($\mu g/m^3$)	1.63	1.87	1.89	2.24	2.49	2.49	5	No
Annual ($\mu g/m^3$)	0.26	0.26	0.30	0.26	0.24	0.30	1	No

*Assumes total conversion of NO to NO_2.
†Tier 1 impact multiplied by national default NO_2/NO_x ratio of 0.75.

Source: ECT, 2009.

Table 8-4. PSD Class II SIL Analysis Summary—BFB Boiler at 70-Percent Load: GREC Site Surface Characteristics

	Year of Meteorology 2001	2002	2003	2004	2005	Maximum Impact ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Exceed SIL? (Yes/No)
Nominal 10 g/s Impacts:								
High, 1-hour ($\mu g/m^3$)	11.76	11.33	11.68	11.85	11.36			
High, 3-hour ($\mu g/m^3$)	8.94	9.06	9.03	9.90	9.77			
High, 8-hour ($\mu g/m^3$)	6.67	7.08	7.68	8.15	8.18			
High, 24-hour ($\mu g/m^3$)	4.41	3.79	5.21	4.85	6.04			
Annual ($\mu g/m^3$)	0.50	0.55	0.56	0.51	0.51			
SO_2								
Emission rate (g/s)	4.91	4.91	4.91	4.91	4.91			
High, 3-hour ($\mu g/m^3$)	4.39	4.45	4.44	4.86	4.80	4.86	25	No
High, 24-hour ($\mu g/m^3$)	2.17	1.86	2.56	2.38	2.97	2.97	5	No
Annual ($\mu g/m^3$)	0.25	0.27	0.28	0.25	0.25	0.28	1	No
NO_x								
Emission rate (g/s)	8.39	8.39	8.39	8.39	8.39			
Tier 1 annual ($\mu g/m^3$)*	0.42	0.46	0.47	0.43	0.43	0.47	1	No
Tier 2 annual ($\mu g/m^3$)†	0.32	0.35	0.35	0.32	0.32	0.35	1	No
CO								
Emission rate (g/s)	14.38	14.38	14.38	14.38	14.38			
High, 1-hour ($\mu g/m^3$)	16.91	16.29	16.79	17.04	16.33	17.04	2,000	No
High, 8-hour ($\mu g/m^3$)	9.59	10.18	11.04	11.72	11.76	11.76	500	No
PM_{10}								
Emission rate (g/s)	5.03	5.03	5.03	5.03	5.03			
High, 24-hour ($\mu g/m^3$)	2.22	1.91	2.62	2.44	3.04	3.04	5	No
Annual ($\mu g/m^3$)	0.25	0.28	0.28	0.26	0.25	0.28	1	No

*Assumes total conversion of NO to NO_2.
†Tier 1 impact multiplied by national default NO_2/NO_x ratio of 0.75.

Source: ECT, 2009.

Table 8-5. PSD Class II SIL Analysis Details—BFB Boiler Annual Average NO_2 Impacts

	Year of Meteorology				
	2001	2002	2003	2004	2005
Tier 1 maximum predicted NO_2 impact ($\mu g/m^3$)*	0.47	0.51	**0.52**	0.47	0.45
Tier 2 maximum predicted NO_2 impact ($\mu g/m^3$)†	0.35	0.38	0.39	0.35	0.34
Receptor UTM easting (meter)	364,326	364,326	365,610	365,710	364,614
Receptor UTM northing (meter)	3,293,577	3,293,626	3,294,125	3,294,125	3,293,209
Distance from grid origin (meter)	727	712	671	762	732
Direction from grid origin (degrees)	250	254	63	67	213
Receptor elevation (meter, amsl)	55.42	55.13	55.84	55.84	55.92
PSD modeling SIL ($\mu g/m^3$)	1.0	1.0	1.0	1.0	1.0
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	35.0	38.0	39.0	35.0	34.0
PSD monitoring d*e minimis* impact level ($\mu g/m^3$)	14.0	14.0	14.0	14.0	14.0
Exceed PSD monitoring d*e minimis* impact level? (Yes/No)	No	No	No	No	No
Percent of PSD monitoring *de minimis* impact level (%)	2.5	2.7	2.8	2.5	2.4

Note: Distance and direction measured from BFB stack at UTM 365,001 meters easting, and 3,293,825 meters northing.
Maximum impact shown in **bold**.
Maximum impact for GRA or GREC Site surface characteristics and for 100-percent or 70-percent loads.

*Assumes total conversion of NO to NO_2.
†Tier 1 impact multiplied by national default NO_2/NO_x ratio of 0.75.

Source: ECT, 2009.

Table 8-6. PSD Class II SIL Analysis Details—BFB Boiler 3-Hour Average SO_2 Impacts

	Year of Meteorology				
	2001	2002	2003	2004	2005
Maximum predicted impact ($\mu g/m^3$)	5.32	5.01	5.19	**5.63**	5.24
Receptor UTM easting (meter)	365,610	365,410	365,510	364,639	365,710
Receptor UTM northing (meter)	3,293,625	3,293,325	3,294,125	3,293,518	3,293,925
Distance from grid origin (meter)	632	640	583	481	707
Direction from grid origin (degrees)	108	141	59	230	82
Receptor elevation (meter, amsl)	55.57	53.59	55.57	56.15	56.15
Date of maximum impact (YYMMDDHH)	01030615	02061212	03051612	04092612	05112124
PSD modeling SIL ($\mu g/m^3$)	25.0	25.0	25.0	25.0	25.0
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	21.3	20.0	20.8	22.5	21.0

Note: Distance and direction measured from BFB stack at UTM 365,001 meters easting, and 3,293,825 meters northing.
Maximum impact shown in **bold**.
Maximum impact for GRA or GREC Site surface characteristics and for 100-percent or 70-percent loads.

Source: ECT, 2009.

Table 8-7. PSD Class II SIL Analysis Details—BFB Boiler 24-Hour Average SO_2 Impacts

	Year of Meteorology				
	2001	2002	2003	2004	2005
Maximum predicted impact (μg/m^3)	2.40	2.12	2.94	2.62	**3.27**
Receptor UTM easting (meter)	365,010	364,326	364,710	364,710	364,710
Receptor UTM northing (meter)	3,292,925	3,293,821	3,293,025	3,292,825	3,293,025
Distance from grid origin (meter)	900	683	854	1,044	854
Direction from grid origin (degrees)	180	270	201	197	201
Receptor elevation (meter, amsl)	53.02	54.45	55.46	54.49	55.46
Date of maximum impact (YYMMDDHH)	01111524	02081024	03110924	04111424	05011524
PSD modeling SIL (μg/m^3)	25.0	25.0	25.0	25.0	25.0
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	9.6	8.5	11.8	10.5	13.1
PSD monitoring d*e minimis* impact level (μg/m^3)	13.0	13.0	13.0	13.0	13.0
Exceed PSD monitoring d*e minimis* impact level? (Yes/No)	No	No	No	No	No
Percent of PSD monitoring *de minimis* impact level (%)	18.5	16.3	22.6	20.2	25.2

Note: Distance and direction measured from BFB stack at UTM 365,001 meters easting, and 3,293,825 meters northing.
Maximum impact shown in **bold**.
Maximum impact for GRA or GREC Site surface characteristics and for 100-percent or 70-percent loads.

Source: ECT, 2009.

Table 8-8. PSD Class II SIL Analysis Details—BFB Boiler Annual Average SO_2 Impacts

	Year of Meteorology				
	2001	2002	2003	2004	2005
Maximum predicted impact ($\mu g/m^3$)	0.27	0.30	**0.31**	0.27	0.26
Receptor UTM easting (meter)	364,326	364,326	365,610	365,710	364,614
Receptor UTM northing (meter)	3,293,577	3,293,626	3,294,125	3,294,125	3,293,209
Distance from grid origin (meter)	727	712	671	762	732
Direction from grid origin (degrees)	250	254	63	67	213
Receptor elevation (meter, amsl)	55.42	55.13	55.84	55.84	55.92
PSD modeling SIL ($\mu g/m^3$)	25.0	25.0	25.0	25.0	25.0
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	1.1	1.2	1.2	1.1	1.0

Note: Distance and direction measured from BFB stack at UTM 365,001 meters easting, and 3,293,825 meters northing.
Maximum impact shown in **bold**.
Maximum impact for GRA or GREC Site surface characteristics and for 100-percent or 70-percent loads.

Source: ECT, 2009.

to the PSD *de minimis* levels used to determine the need for preconstruction ambient air quality monitoring. As shown in Tables 8-5 and 8-7, the predicted concentrations of NO_x and SO_2 are below the PSD *de minimis* levels.

The two GREC emergency diesel engines will combust ULSD fuel oil and will operate infrequently for testing and routine maintenance. Accordingly, the emergency diesel engines will emit minor amounts of SO_2, NO_x, CO, and PM_{10}. As suggested in agency comments on the modeling protocol, the emergency diesel engines were evaluated with respect to those pollutants that have short-term averaging periods of concern; i.e., SO_2, CO, and PM_{10}. Diesel engine SO_2 emissions and air quality impacts will be insignificant since the engines will be fired with ULSD fuel oil; e.g., the maximum SO_2 emission rate for the larger emergency diesel engine is only 0.0020 lb/hr. As discussed in the following, the diesel engines were included in the GREC emission inventory for the assessment of PM_{10} impacts. Accordingly, the emergency diesel engines along with the BFB boiler were modeled for CO to assess the combined impacts of these GREC emission sources with respect to the PSD CO SILs. Table 8-9 summarizes the results, which confirms the conclusion that GREC CO impacts will not exceed the PSD Class II SILs. The predicted 8-hour CO impacts significantly overestimate the actual GREC impacts, since it was assumed that the diesel engines would operate continuously for the entire 8-hour period. In reality, emergency diesel engines are expected to operate for no more than 2 hours during each periodic maintenance and testing event. Tables 8-10 and 8-11 provide detailed results for the GREC maximum CO impacts for each modeled year. In addition to being below SILs, the predicted CO concentrations were also below the PSD *de minimis* level.

In addition to the BFB boiler and emergency diesel engines, GREC will include material (i.e., biomass fuel, DSI sorbent, and fly ash) handling, processing, and storage activities, and a mechanical draft cooling tower that will emit PM_{10}. Many of these PM_{10} emission sources will result in fugitive emissions with a low release height (e.g., truck traffic on paved facility roadways and material transfer points) and therefore would be expected to have PM_{10} air quality impacts much closer to the GREC boundaries than emissions from the 230-ft BFB boiler stack. Accordingly, all GREC PM_{10} sources were included in the

Table 8-9. Summary of GREC CO PSD Class II SIL Analysis

Pollutant	Averaging Period	Meteorological Site Surface Characteristics	Maximum Predicted Concentration (μg/m^3) Year of Meteorology 2001	2002	2003	2004	2005	Maximum Impact	SIL (μg/m^3)	Exceed SIL? (Yes/No)
CO	1-hour	GRA	418.1	**420.5**	413.8	418.4	405.2	420.5	2,000	No
		GREC Site	414.2	**419.2**	410.0	414.1	401.3	419.2	2,000	No
	8-hour	GRA	152.0	**157.1**	140.9	140.7	122.3	157.1	500	No
		GREC Site	140.4	**159.9**	143.2	142.7	127.8	159.9	500	No

Note: Maximum impact for 100-percent or 70-percent BFB boiler load.
Maximum impact shown in bold.

Source: ECT, 2009.

Table 8-10. PSD Class II SIL Analysis Details—GREC 1-Hour Average CO Impacts

	Year of Meteorology				
	2001	2002	2003	2004	2005
Maximum predicted impact ($\mu g/m^3$)	418.1	**420.5**	413.8	418.4	405.2
Receptor UTM easting (meter)	365,109	365,109	365,109	365,109	365,109
Receptor UTM northing (meter)	3,294,069	3,294,069	3,294,069	3,294,069	3,294,069
Distance from grid origin (meter)	263	263	263	263	263
Direction from grid origin (degrees)	22	22	22	22	22
Receptor elevation (meter, amsl)	54.94	54.94	54.94	54.94	54.94
Date of maximum impact (YYMMDDHH)	01022601	02092722	03040904	04070421	05083102
PSD modeling SIL ($\mu g/m^3$)	2,000	2,000	2,000	2,000	2,000
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	20.9	21.0	20.7	20.9	20.3

Note: Distance and direction measured from BFB stack at UTM 365,001 meters easting, and 3,293,825 meters northing.
Maximum impact shown in **bold**.
Maximum impact for GRA or GREC Site surface characteristics and for 100-percent or 70-percent loads.

Source: ECT, 2009.

Table 8-11. PSD Class II SIL Analysis Details—GREC 8-Hour Average CO Impacts

	Year of Meteorology				
	2001	2002	2003	2004	2005
Maximum predicted impact (µg/m^3)	152.0	**159.9**	143.2	142.7	127.8
Receptor UTM easting (meter)	364,734	365,109	365,109	365,109	365,109
Receptor UTM northing (meter)	3,293,715	3,294,069	3,294,069	3,294,069	3,294,069
Distance from grid origin (meter)	297	263	263	263	263
Direction from grid origin (degrees)	248	22	22	22	22
Receptor elevation (meter, amsl)	56.15	54.94	54.94	54.94	54.94
Date of maximum Impact (YYMMDDHH)	01091108	02092724	03012108	04082724	05031308
PSD modeling SIL (µg/m^3)	500	500	500	500	500
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	30.4	32.0	28.6	28.5	25.6
PSD monitoring d*e minimis* Impact Level (µg/m^3)	575	575	575	575	575
Exceed PSD monitoring d*e minimis* impact level? (Yes/No)	No	No	No	No	No
Percent of PSD monitoring *de minimis* impact level (%)	26.4	27.8	24.9	24.8	22.2

Note: Distance and direction measured from BFB stack at UTM 365,001 meters easting, and 3,293,825 meters northing.
Maximum impact shown in **bold**.
Maximum impact for GRA or GREC Site surface characteristics and for 100-percent or 70-percent loads.

Source: ECT, 2009.

PSD Class II SIL modeling. Table 8-12 provides the summary of the AERMOD results. As can be seen, the PSD Class II SILs for PM_{10} were exceeded for all averaging times and model years. Tables 8-13 and 8-14 show detailed model results for the GREC maximum PM_{10} impacts for each modeled year. Plan view drawings showing the spatial distribution of the predicted PM_{10} concentrations (i.e., concentration isopleths) were prepared for each pollutant and each averaging period for the year in which the highest impact occurred. Figures 8-1 through 8-8 provide these PM_{10} concentration isopleths.

Although the 24-hour PSD *de minimis* level for PM_{10} was predicted to be exceeded (see Table 8-13), GREC is not proposing to perform preconstruction ambient air quality monitoring for the following reasons:

- Adequate ambient PM_{10} monitoring data already exists in Alachua County for establishing background air quality.
- 24-hour PM_{10} impacts predicted to exceed the *de minimis* level of 10 $\mu g/m^3$ are highly localized and occur in the DGS site and GRU property adjacent to the GREC site (see Figure 8-7).

Further discussion of ambient air quality monitoring is provided in Section 9.0

8.1.2 PSD CLASS II INCREMENT AND NAAQS ANALYSIS RESULTS

Since GREC 24-hour and annual PM_{10} impacts are predicted to exceed the PSD Class SILs, a multisource cumulative analysis of air quality impacts with respect to the 24-hour and annual PM_{10} NAAQS and PSD Class II increments is required. As previously discussed in Section 7.0, only those receptors that were predicted to have an impact above the PSD PM_{10} significance level for any year or averaging period were assessed in the cumulative analysis (see Figure 7-5).

The maximum distance to significance for PM_{10}, based on the 24-hour and annual averaging periods for all years of meteorological data evaluated, was determined to be 1.1 km. Although it would have been acceptable to only include offsite sources of PM_{10} emissions within a radius of 51.1 km (i.e., maximum distance to significance plus

Table 8-12. Summary of GREC PM_{10} PSD Class II SIL Analysis

Pollutant	Averaging Period	Meteorological Site Surface Characteristics	Maximum Predicted Concentration (µg/m³) Year of Meteorology 2001	2002	2003	2004	2005	Maximum Impact	SIL (µg/m³)	Exceed SIL? (Yes/No)
PM_{10}	24-hour	GRA	18.4	17.0	17.6	17.3	**20.4**	20.4	5	Yes
		GREC Site	**15.9**	14.4	15.3	13.2	12.1	15.9	5	Yes
	Annual	GRA	5.2	**5.3**	4.7	4.5	5.0	5.3	1	Yes
		GREC Site	**4.1**	4.0	3.7	3.5	3.9	4.1	1	Yes

Note: Maximum impact for 100-percent or 70-percent BFB boiler load.
Maximum impact shown in bold.

Source: ECT, 2009.

Table 8-13. PSD Class II SIL Analysis Details—GREC 24-Hour Average PM_{10} Impacts

	Year of Meteorology				
	2001	2002	2003	2004	2005
Maximum predicted impact ($\mu g/m^3$)	18.4	17.0	17.6	17.3	**20.4**
Receptor UTM easting (meter)	364,967	364,967	364,967	365,061	365,061
Receptor UTM northing (meter)	3,293,714	3,293,714	3,293,714	3,293,714	3,293,714
Distance from grid origin (meter)	119	119	119	122	122
Direction from grid origin (degrees)	201	201	201	155	155
Receptor elevation (meter, amsl)	56.15	56.15	56.15	56.15	56.15
Date of maximum impact (YYMMDDHH)	01102224	02120824	03101324	04110524	05122024
PSD modeling SIL ($\mu g/m^3$)	5.0	5.0	5.0	5.0	5.0
Exceed PSD modeling SIL? (Yes/No)	Yes	Yes	Yes	Yes	Yes
Percent of PSD modeling SIL (%)	367.4	339.4	352.6	346.8	407.4
PSD monitoring d*e minimis* impact level ($\mu g/m^3$)	10.0	10.0	10.0	10.0	10.0
Exceed PSD monitoring d*e minimis* impact level? (Yes/No)	Yes	Yes	Yes	Yes	Yes
Percent of PSD monitoring *de minimis* impact level (%)	183.7	169.7	176.3	173.4	203.7

Note: Distance and direction measured from BFB stack at UTM 365,001 meters easting, and 3,293,825 meters northing.
Maximum impact shown in **bold**.
Maximum impact for GRA or GREC Site surface characteristics and for 100-percent or 70-percent loads.

Source: ECT, 2009.

Table 8-14. PSD Class II SIL Analysis Details—GREC Annual Average PM_{10} Impacts

	Year of Meteorology				
	2001	2002	2003	2004	2005
Maximum predicted impact ($\mu g/m^3$)	5.2	**5.3**	4.7	4.5	5.0
Receptor UTM easting (meter)	364,967	364,920	364,967	364,967	364,967
Receptor UTM northing (meter)	3,293,714	3,293,715	3,293,714	3,293,714	3,293,714
Distance from grid origin (meter)	119	142	119	119	119
Direction from grid origin (degrees)	201	219	201	201	201
Receptor elevation (meter, amsl)	56.15	56.15	56.15	56.15	56.15
PSD modeling SIL ($\mu g/m^3$)	1.0	1.0	1.0	1.0	1.0
Exceed PSD modeling SIL? (Yes/No)	Yes	Yes	Yes	Yes	Yes
Percent of PSD modeling SIL (%)	519.0	525.0	474.0	445.0	495.0

Note: Distance and direction measured from BFB stack at UTM 365,001 meters easting, and 3,293,825 meters northing.
Maximum impact shown in **bold**.
Maximum impact for GRA or GREC Site surface characteristics and for 100-percent or 70-percent loads.

Source: ECT, 2009.

File: M:\acad\090408\Average_Concentration_NO2.mxd

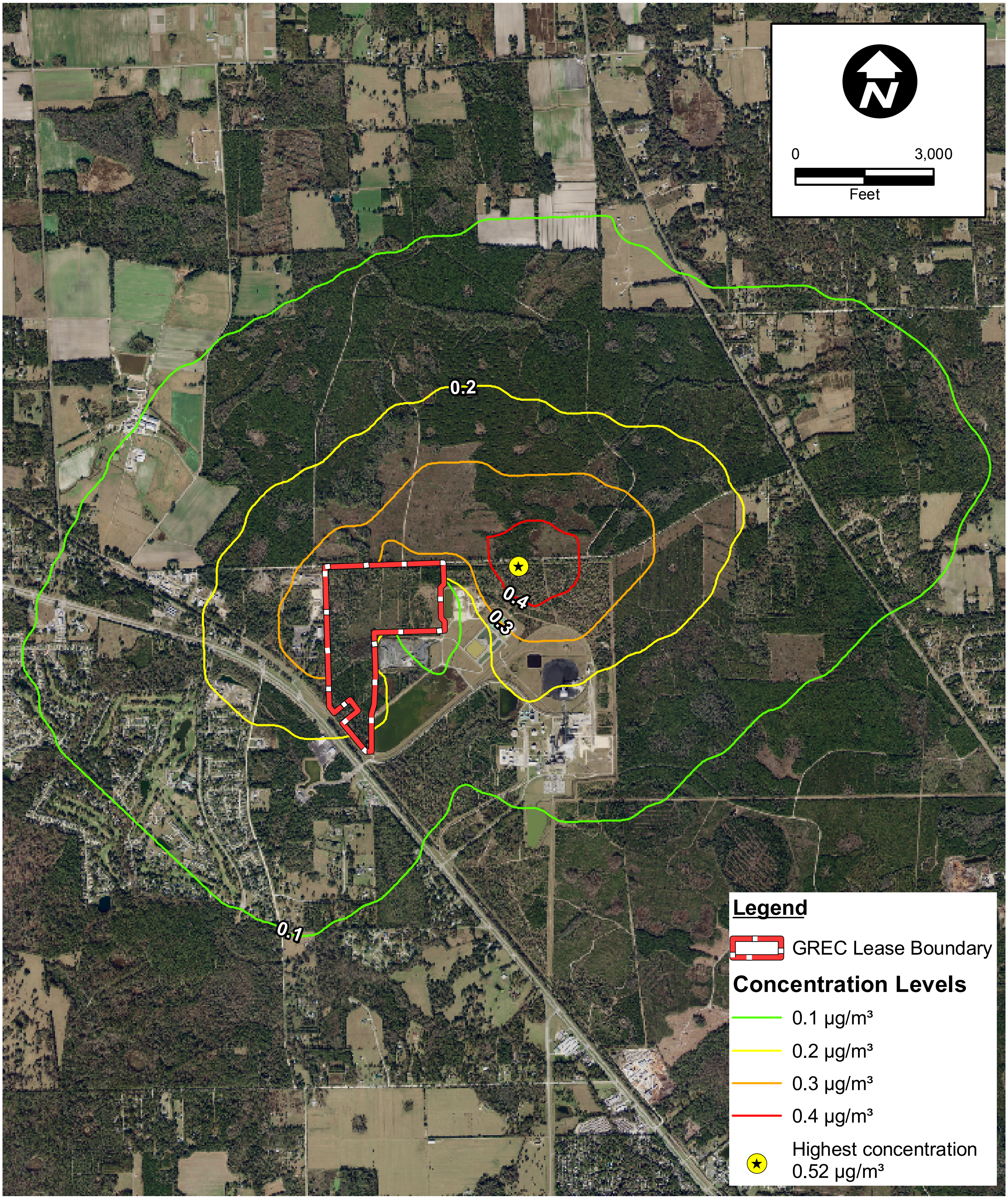

FIGURE 8-1.

GREC MAXIMUM ANNUAL NO_2 IMPACT
MODEL YEAR 2003

Sources: FDOT, 2008; ECT, 2009,

Gainesville Renewable Energy Center
An American Renewables Company

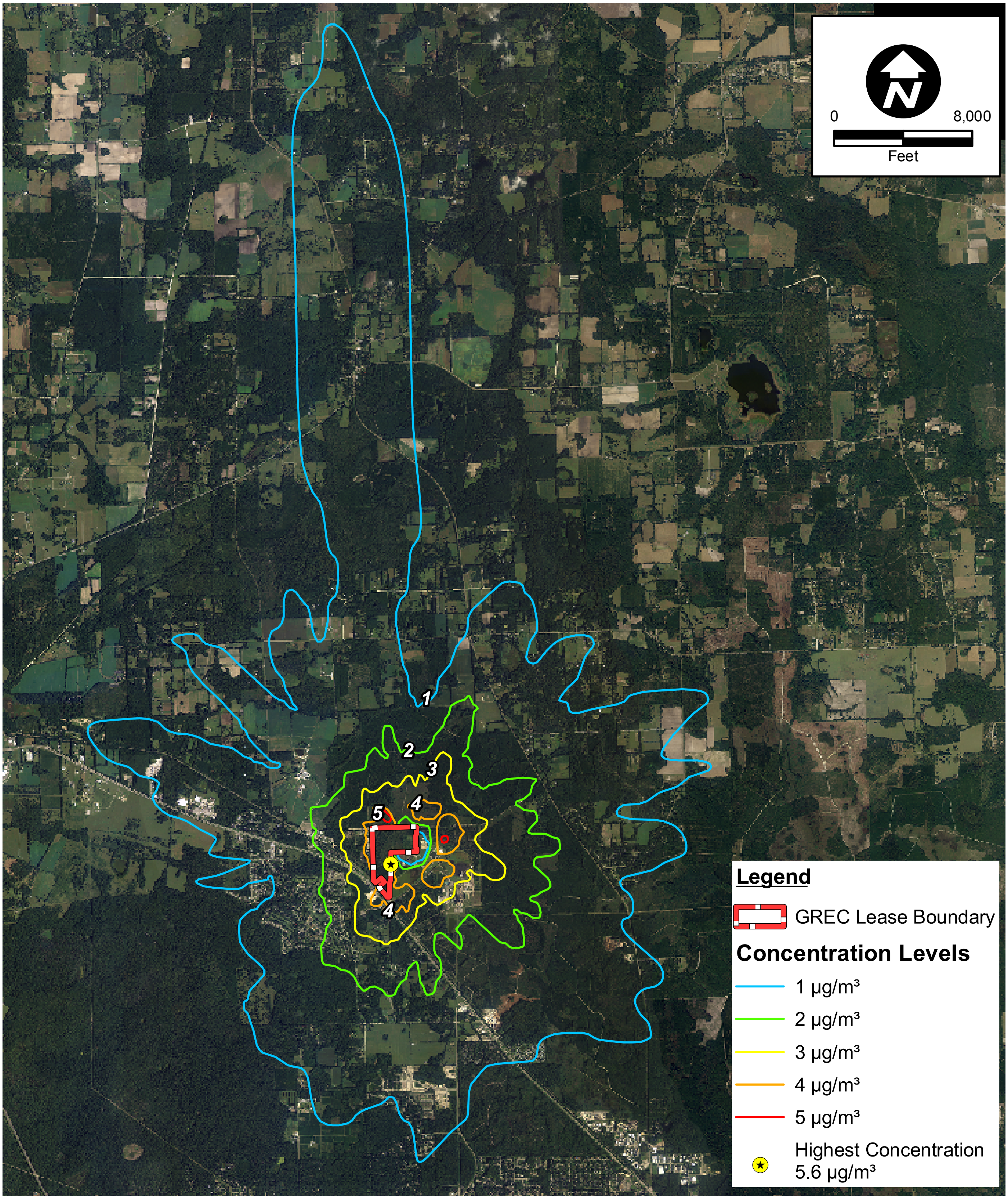

FIGURE 8-2.

GREC MAXIMUM 3- HOUR SO_2 IMPACT
MODEL YEAR 2004

Sources: FDOT, 2008; ECT, 2009,

Gainesville Renewable Energy Center
An American Renewables Company

File: M:\acad\090408\Average_Concentration_24hour_SO2.mxd

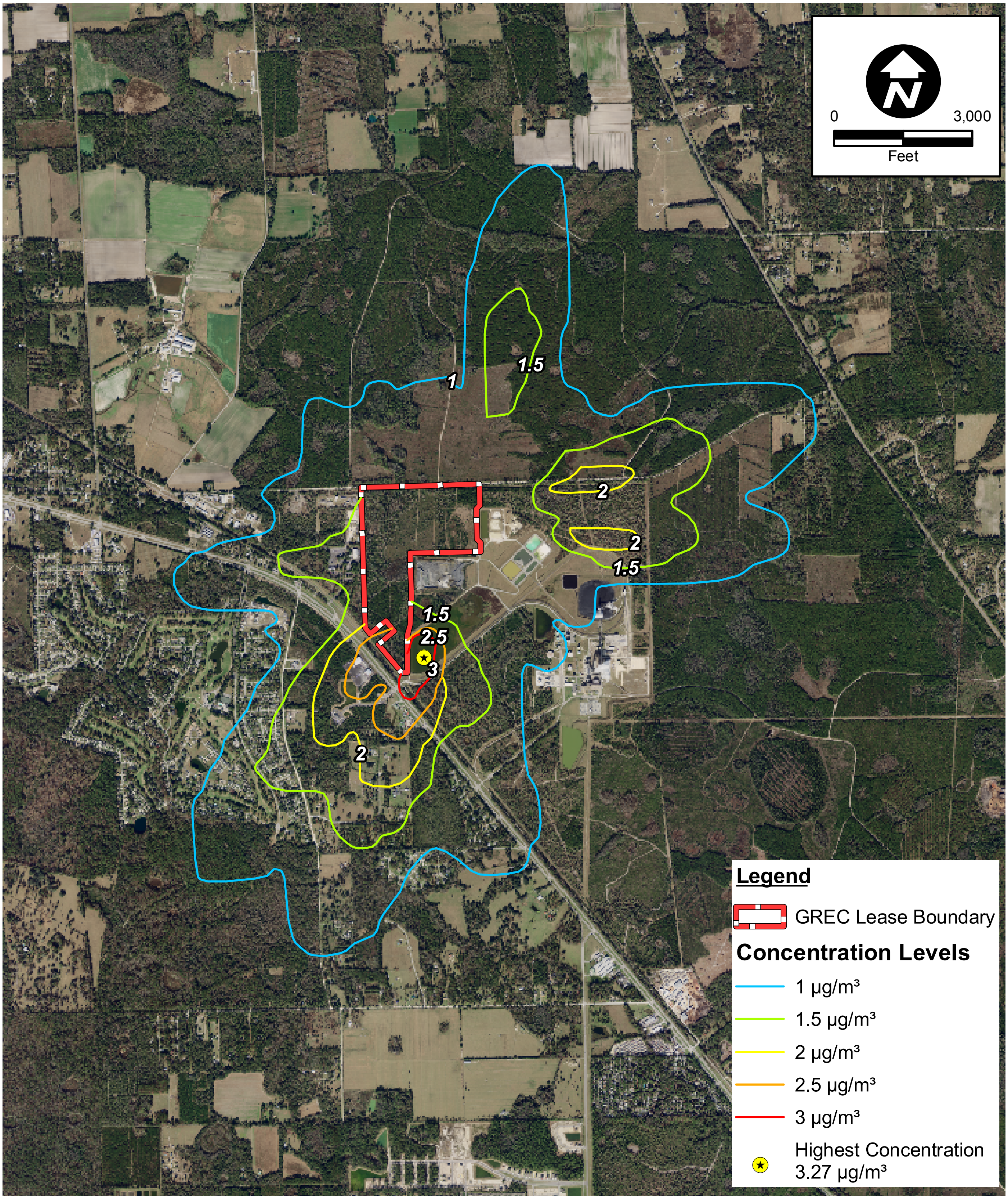

FIGURE 8-3.

GREC MAXIMUM 24-HOUR SO_2 IMPACT
MODEL YEAR 2005

Sources: FDOT, 2008; ECT, 2009,

Gainesville Renewable Energy Center
An American Renewables Company

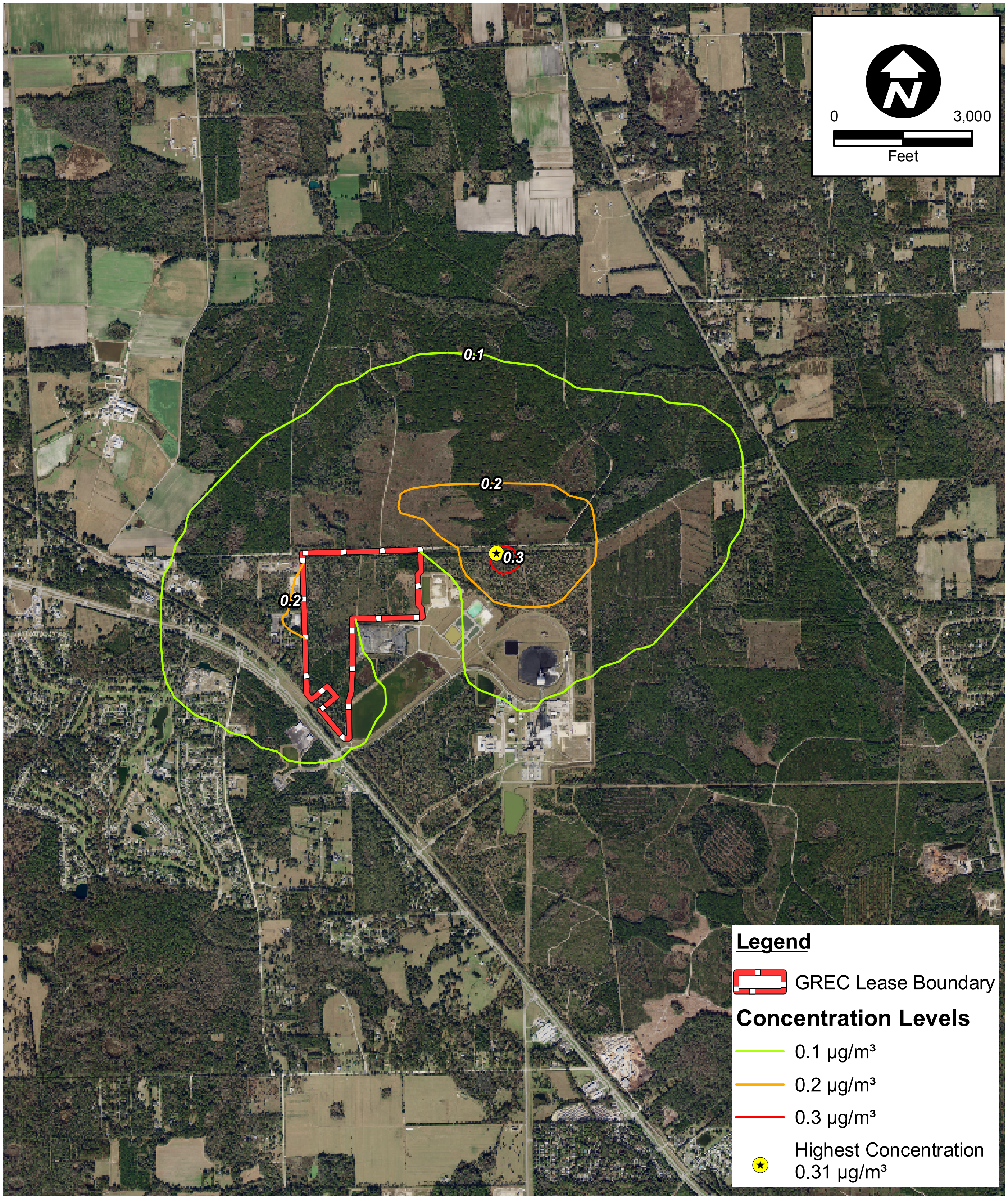

FIGURE 8-4.

GREC MAXIMUM ANNUAL SO_2 IMPACT
MODEL YEAR 2003

Sources: FDOT, 2008; ECT, 2009,

Gainesville Renewable Energy Center
An American Renewables Company

File: M:\acad\090408\Average_Concentration_1hour_CO2.mxd

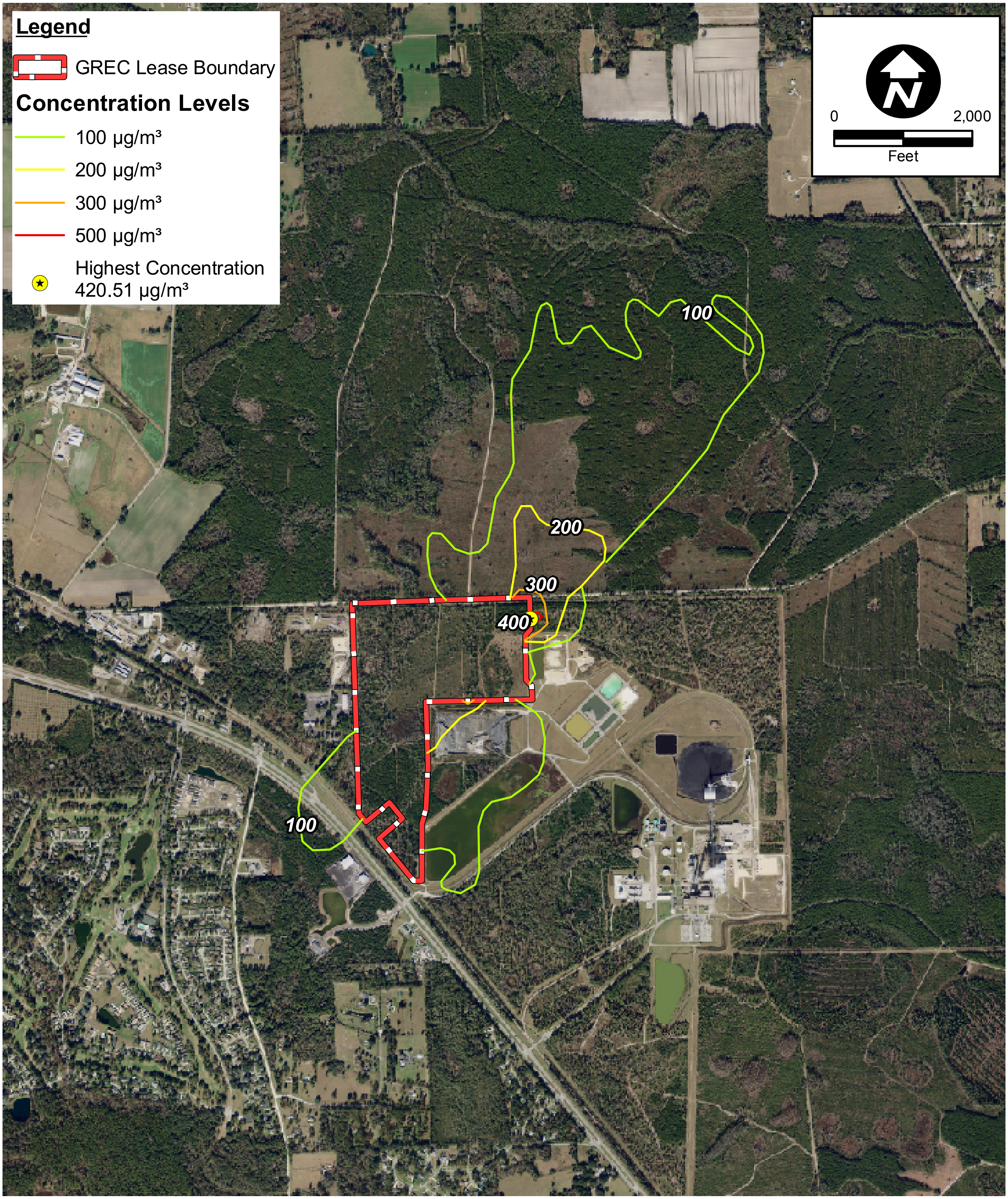

FIGURE 8-5.

MAXIMUM 1-HOUR CO IMPACT
FROM GREC FOR MODEL YEAR 2002

Sources: FDOT, 2008; ECT, 2009,

ECT
Environmental Consulting & Technology, Inc.

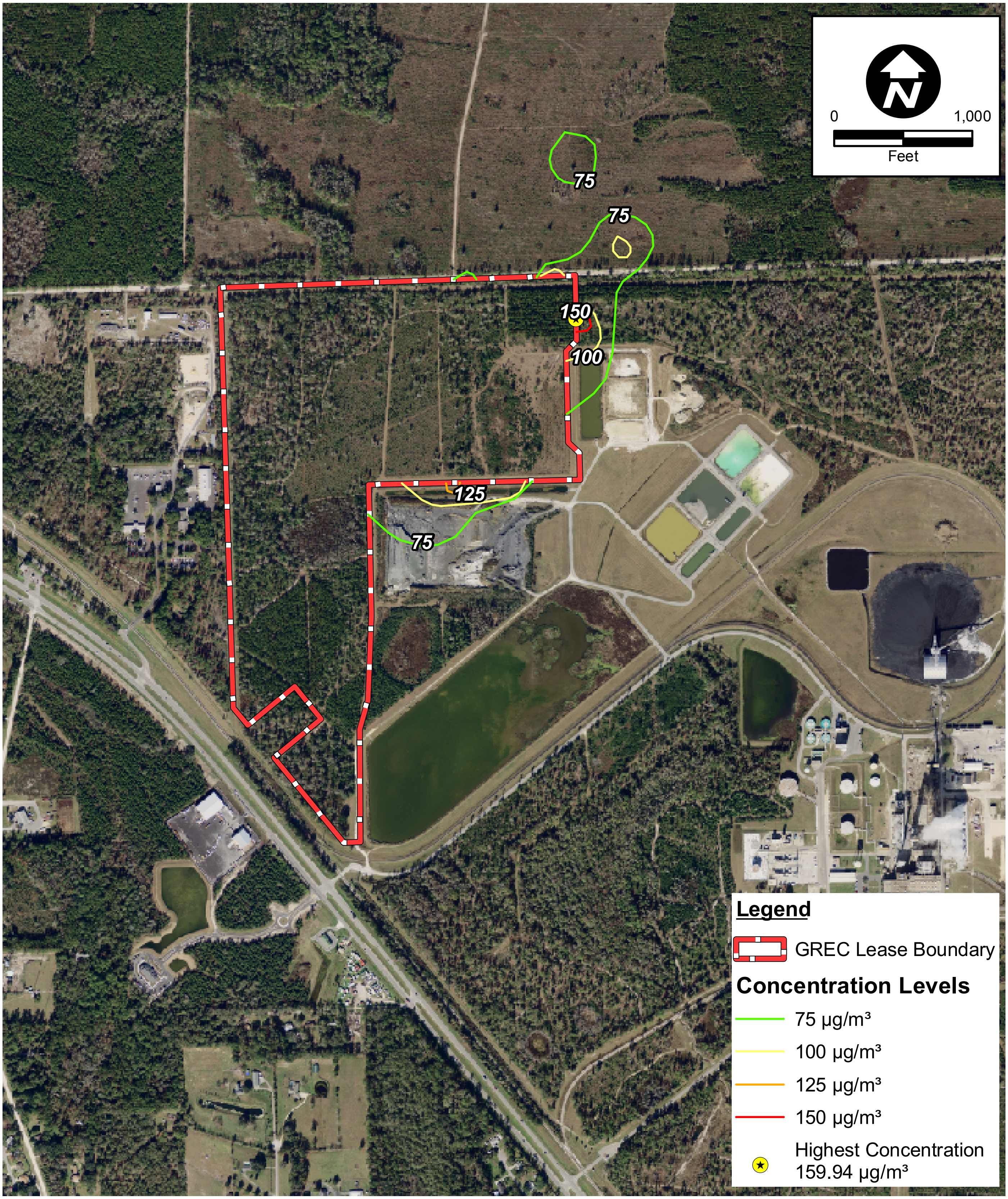

FIGURE 8-6.

GREC MAXIMUM 8-HOUR CO IMPACT
MODEL YEAR 2002

Sources: FDOT, 2008; ECT, 2009,

Gainesville Renewable Energy Center
An American Renewables Company

File: M:\acad\090408\Average_Concentration_24hour_PM10.mxd

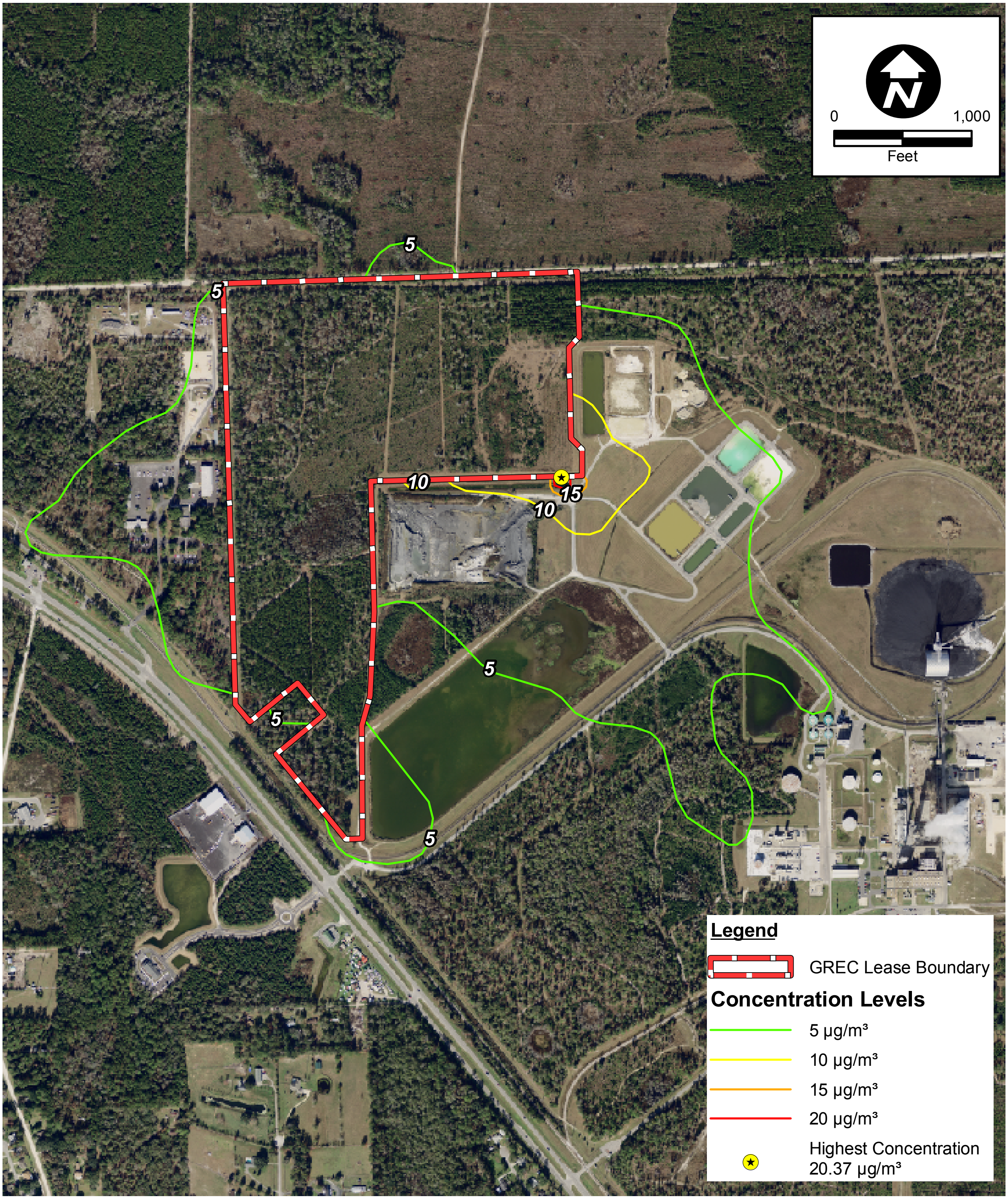

FIGURE 8-7.

GREC MAXIMUM 24- HOUR PM_{10} IMPACT
MODEL YEAR 2005

Sources: FDOT, 2008; ECT, 2009,

Gainesville Renewable Energy Center
An American Renewables Company

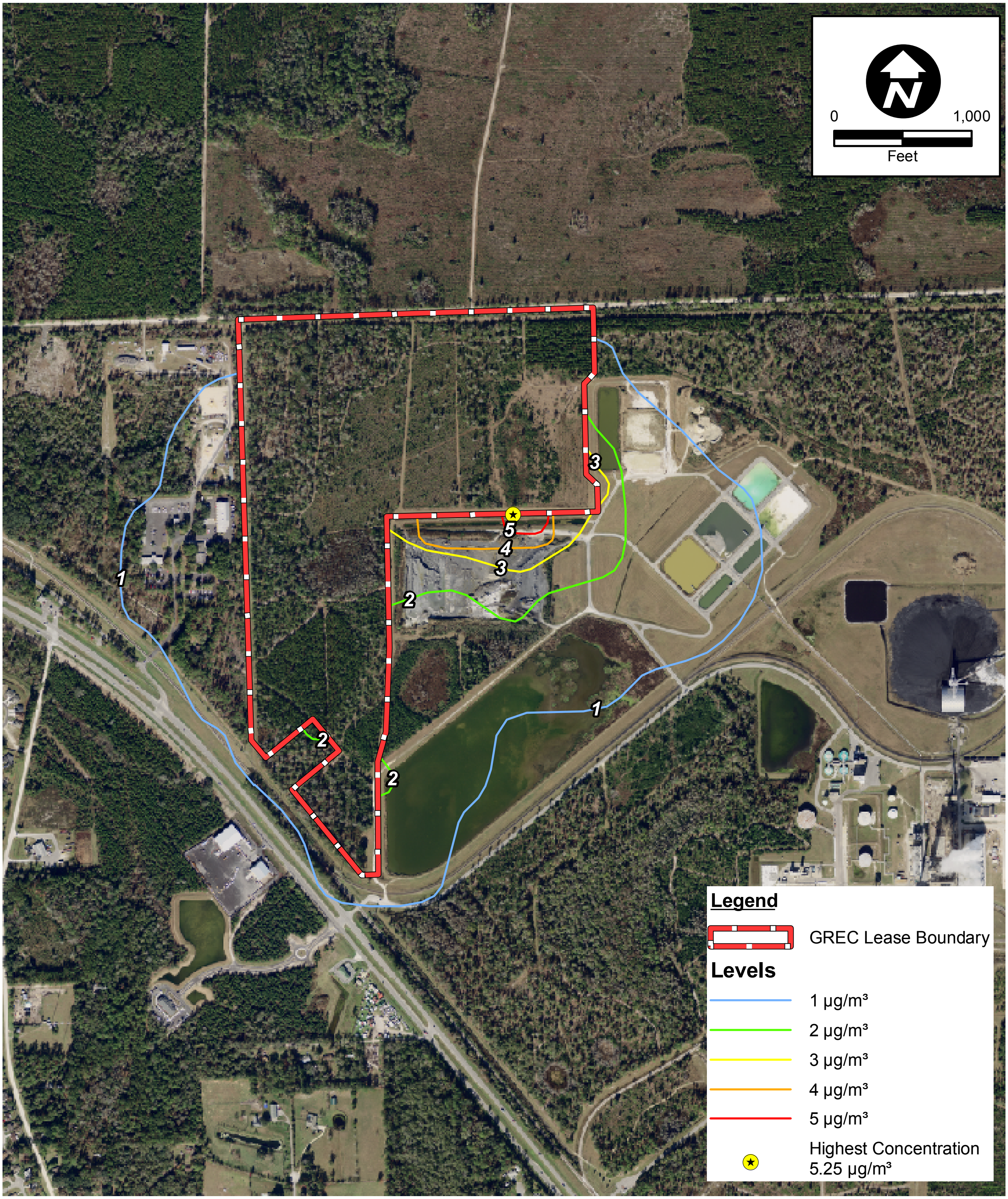

FIGURE 8-8.

GREC MAXIMUM ANNUAL PM_{10} IMPACT
MODEL YEAR 2002

Sources: FDOT, 2008; ECT, 2009,

Gainesville Renewable Energy Center
An American Renewables Company

50 km), an inventory of offsite PM_{10} sources within 60 km of GREC was used. Table 7-5 lists the offsite sources that were selected from the inventory to be included in the NAAQS and PSD Class II increment analyses. For purposes of this analysis, a separate PSD source inventory was not developed; i.e., all PM_{10} sources were conservatively assumed to consume PSD increment.

Table 8-15 summarizes the modeling results of the cumulative analysis. The PM_{10} 24-hour concentrations are the highest, second-highest concentration, which is appropriate for evaluating the PM_{10} PSD increment. The PM_{10} 24-hour average NAAQS is in the form of an expected exceedance value, which cannot be exceeded more than once on average over a 3-year period. For a 5-year meteorological period, the highest, sixth-highest value (H6H) over the 5 years is used to assess compliance with the 24-hour average PM_{10} NAAQS.

The nearest agency PM_{10} ambient air monitoring site to GREC is located approximately 7 km (4.5 miles) south of the GREC site at the intersection of Northwest 53rd Avenue and Northwest 43rd Street. Ambient air quality data for the 2004 through 2008 period (excluding 2007) shows maximum 24-hour and annual average PM_{10} concentrations of 63 and 19 $\mu g/m^3$, respectively. Ambient data at this monitoring site for 2007 was influenced by a fire and therefore not included. These ambient PM_{10} concentrations were added to the modeled concentrations for the NAAQS comparison. This approach is conservative (i.e., will overestimate actual total concentrations) since the air quality impacts for many of the modeled emission sources would be expected to be included in the ambient air monitoring data resulting in double-counting of these emission sources.

Tables 8-16 (24-hour PSD Class II increment), 8-17 (24-hour NAAQS), and 8-18 (annual average impacts) detail the model results for the cumulative PM_{10} impacts. The cumulative PM_{10} modeling demonstrates that air quality impacts from all modeled emission sources, including background, will be well below the 24-hour and annual PSD Class II increments and NAAQS. Therefore, GREC will not cause or contribute to an exceedance of the PM_{10} PSD increments or NAAQS.

Table 8-15. Summary of PM_{10} Cumulative Analysis

Pollutant	Averaging Period	Meteorological Site Surface Characteristics	Maximum Predicted Concentration (µg/m^3) Year of Meteorology 2001	2002	2003	2004	2005	Maximum Impact
PM_{10}	24-hour (2nd High)	GRA	**16.4**	16.0	16.1	15.2	16.1	16.4
		GREC Site	**13.7**	13.5	13.6	12.8	12.0	13.7
	24-hour (6th High)*	GRA	N/A	N/A	N/A	N/A	16.0	16.0
		GREC Site	N/A	N/A	N/A	N/A	13.6	13.6
	Annual	GRA	5.9	**6.1**	5.5	5.4	5.8	6.1
		GREC Site	**4.9**	4.8	4.5	4.4	4.8	4.9

Note: Maximum impact for 100-percent or 70-percent BFB boiler load.
Maximum impact shown in bold.

*Highest, sixth highest value (H6H) over the 5-year (2001 through 2005) period.

Source: ECT, 2009.

Table 8-16. PM_{10} Cumulative Analysis Details—24-Hour Average PM_{10} Impacts: PSD Class II Increment

	Year of Meteorology				
	2001	2002	2003	2004	2005
Predicted highest, 2nd highest (H2H) concentration ($\mu g/m^3$)	**16.4**	16.0	16.1	15.2	16.1
Receptor UTM easting (meter)	364,967	364,967	364,967	365,061	365,061
Receptor UTM northing (meter)	3,293,714	3,293,714	3,293,714	3,293,714	3,293,714
Distance from grid origin (meter)	119	119	119	122	122
Direction from grid origin (degrees)	201	201	201	155	155
Receptor elevation (meter, amsl)	56.15	56.15	56.15	56.15	56.15
Date of maximum impact (YYMMDDHH)	01120324	02012624	03122624	04110624	05013024
PSD increment level ($\mu g/m^3$)	30	30	30	30	30
Exceed PSD Class II increment level? (Yes/No)	No	No	No	No	No
Percent of PSD Class II increment level (%)	54.7	53.2	53.8	50.5	53.8

Note: Distance and direction measured from BFB stack at UTM 365,001 meters easting, and 3,293,825 meters northing.
Maximum impact shown in **bold**.
Maximum impact for GRA or GREC Site surface characteristics and for 100-percent or 70-percent loads.

Source: ECT, 2009.

Table 8-17. PM_{10} Cumulative Analysis Details—24-Hour Average PM_{10} Impacts: NAAQS

	Year of Meteorology				
	2001	2002	2003	2004	2005
Predicted highest, 2nd highest (H2H) concentration (µg/m³)	**16.4**	16.0	16.1	15.2	16.1
Background air quality (µg/m³)	63.0	63.0	63.0	63.0	63.0
Total predicted 24-hour concentration (µg/m³)	**79.4**	79.0	79.1	78.2	79.1
Receptor UTM easting (meter)	364,967	364,967	364,967	365,061	365,061
Receptor UTM northing (meter)	3,293,714	3,293,714	3,293,714	3,293,714	3,293,714
Distance from grid origin (meter)	119	119	119	122	122
Direction from grid origin (degrees)	201	201	201	155	155
Receptor elevation (meter, amsl)	56.15	56.15	56.15	56.15	56.15
Date of maximum impact (YYMMDDHH)	01120324	02012624	03122624	04110624	05013024
PM_{10} 24-hour NAAQS (µg/m³)	150	150	150	150	150
Exceed PM_{10} 24-hour NAAQS? (Yes/No)	No	No	No	No	No
Percent of annual NAAQS (%)	52.9	52.6	52.8	52.1	52.8

Note: Distance and direction measured from BFB stack at UTM 365,001 meters easting, and 3,293,825 meters northing.
Maximum impact shown in **bold**.
Maximum impact for GRA or GREC Site surface characteristics and for 100-percent or 70-percent loads.

Source: ECT, 2009.

Table 8-18. PM_{10} Cumulative Analysis Details—Annual Average PM_{10} Impacts

	Year of Meteorology				
	2001	2002	2003	2004	2005
Predicted annual concentration (µg/m^3)	5.9	**6.1**	5.5	5.4	5.8
Background air quality (µg/m^3)	19.0	19.0	19.0	19.0	19.0
Total predicted annual concentration (µg/m^3)	24.9	**25.1**	24.5	24.4	24.8
Receptor UTM easting (meter)	364,967	364,920	364,967	364,967	364,967
Receptor UTM northing (meter)	3,293,714	3,293,715	3,293,714	3,293,714	3,293,714
Distance from grid origin (meter)	119	142	119	119	119
Direction from grid origin (degrees)	201	219	201	201	201
Receptor elevation (meter, amsl)	56.15	56.15	56.15	56.15	56.15
PSD increment level (µg/m^3)	17	17	17	17	17
Exceed PSD Class II increment level? (Yes/No)	No	No	No	No	No
Percent of PSD Class II increment level (%)	34.7	35.9	32.4	31.8	34.1
PM_{10} annual NAAQS (µg/m^3)	50	50	50	50	50
Exceed PM_{10} annual NAAQS? (Yes/No)	No	No	No	No	No
Percent of annual NAAQS (%)	49.8	50.2	49.0	48.8	49.6

Note: Distance and direction measured from BFB stack at UTM 365,001 meters easting, and 3,293,825 meters northing.
Maximum impact shown in **bold**.
Maximum impact for GRA or GREC Site surface characteristics and for 100-percent or 70-percent loads.

Source: ECT, 2009.

8.2 OZONE ANALYSIS

Ozone is formed in a complex series of chemical reactions involving primarily NO_x and VOCs during warm ambient temperatures in the presence of sunlight. Since ozone is formed from precursor pollutants, assessment of ambient ozone impacts is typically conducted on a regional basis using resource-intensive models such as the EPA Community Multiscale Air Quality (CMAQ) model. Currently, all areas of Florida are attaining the 8-hour ozone AAQS.

GREC estimated potential NO_x and VOC emissions are 418.1 and 78.1 tpy, respectively. These annual emission rates are relatively minor in comparison to regional emissions. For example, Duval County (Jacksonville area) NO_x and VOC emissions in 2002 were 76,620 and 57,871 tons, respectively, based on data obtained from the EPA AirData Web site. NO_x and VOC emissions for Orange County (Orlando area) in 2002 were 44,336 and 63,995 tons, respectively. In contrast, Alachua County (Gainesville area) NO_x and VOC emissions in 2002 were 14,763 and 19,351 tons, respectively. Duval and Orange Counties, all of which have higher population densities and greater NO_x and VOC emissions compared to Alachua County (including the emission increases associated with the GREC) currently have monitored ambient ozone levels below the ozone AAQS.

Ambient ozone levels in Alachua County are primarily due to ozone transport from upwind areas. Despite significant increases in population and motor vehicle activity, ambient ozone air quality in Florida has improved over the last 5 years due to improvements in motor vehicle emission rates. Continued reductions in average motor fleet emissions would be expected to further improve ozone air quality. In addition, CAIR will result in significant actual reductions in existing power plant NO_x emissions throughout Florida. During Phase 1 (2009 through 2014) of the CAIR program, EPA estimates that actual Florida power plant NO_x emissions during the 5-month ozone season (May through September) will be reduced from 119,000 tons (in 2003) to 33,000 tons—a reduction of 86,000 tons. In comparison, GREC estimated ozone season NO_x emissions will be only approximately 174 tons. The CAIR power plant emission reductions will occur throughout Florida, including areas in Alachua County, and will occur prior to the commencement of operation of GREC. As an example, GRU is retrofitting emission control systems to its existing DGS Unit 2 that will result in an estimated annual reduction in actual NO_x emissions of 3,200 tons—approximately 7.6 times the estimated GREC NO_x emissions.

In summary, the relatively minor GREC NO_x and VOC emissions will not significantly impact ambient ozone levels in Alachua County or other areas in Florida. Alachua County is projected to remain in compliance with the ozone ambient air quality standard due to the continued significant reductions in regional motor vehicle and power plant emissions.