CARLSBAD ENERGY CENTER

POTENTIAL LOCAL IMPACTS from AIR POLLUTANT EMISSIONS

DOCKET
07-AFC-6
DATE
RECD DEC 03 2009

Evaluation Methods

- Air Quality Impact Analysis (AQIA)
  - Criteria pollutants
  - State and federal ambient air quality statndards (AAQSs)
- Health Risk Assessment
  - Toxic Air Contaminants (TACs)
  - Health values established by CA Office of Health Hazard Assessment (OEHHA)

HRA Terms

- PMI—Point of Maximum Impact
- MEIR—Maximum Exposed Individual Resident
- Cancer Risk—For resident, lifetime (70 years) incremental probability of contracting cancer
- HHI—Health Hazard Index

HRA—Rule 1200

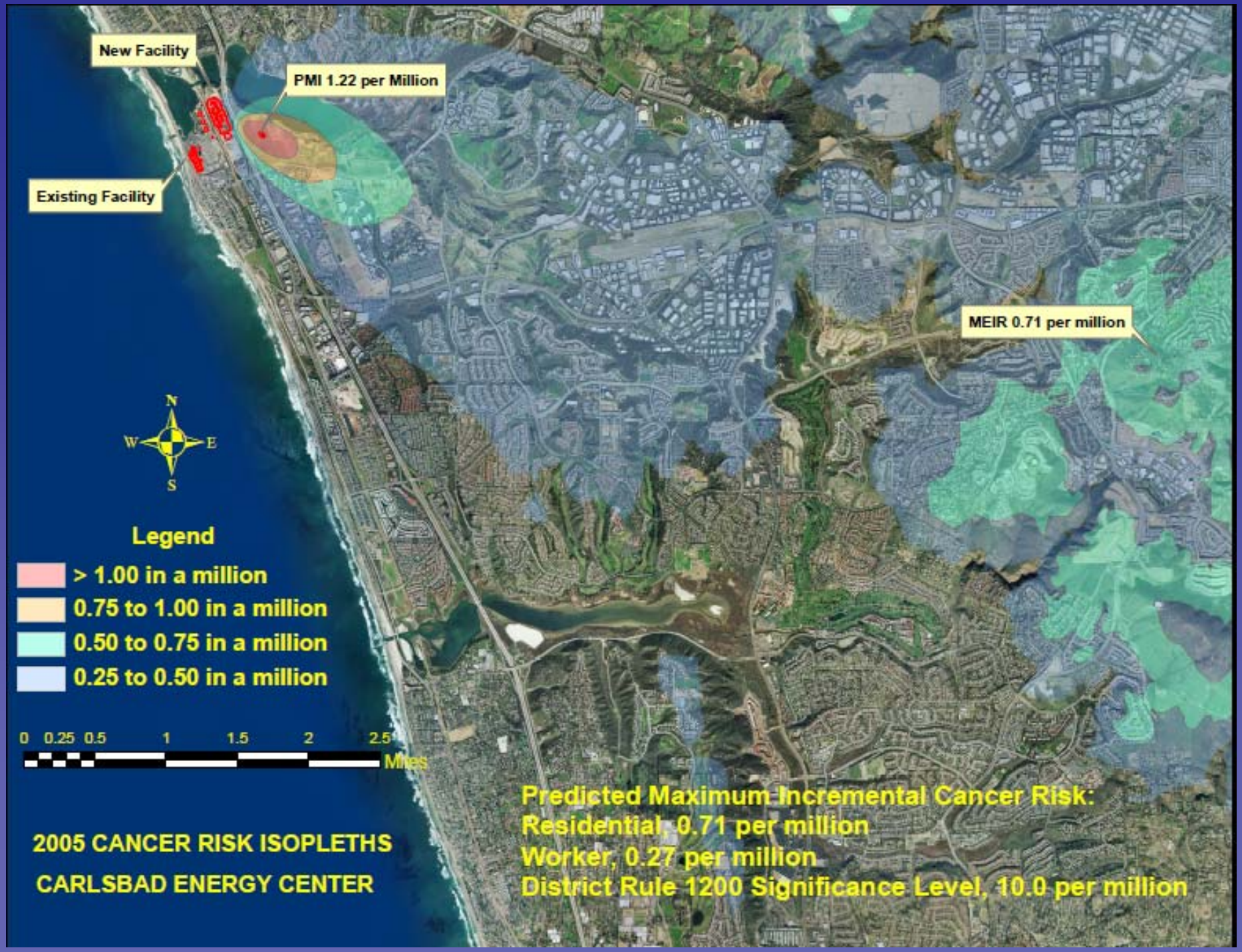
- Toxic Air Contaminants
  - Formaldehyde, Benzene, Acrolein, PAH, etc.
- Standards
  - Cancer risk < one in a million without TBACT
  - Cancer risk < ten in a million with TBACT
  - HHI < 1 (Acute, 8-hour, chronic)
- Background not included

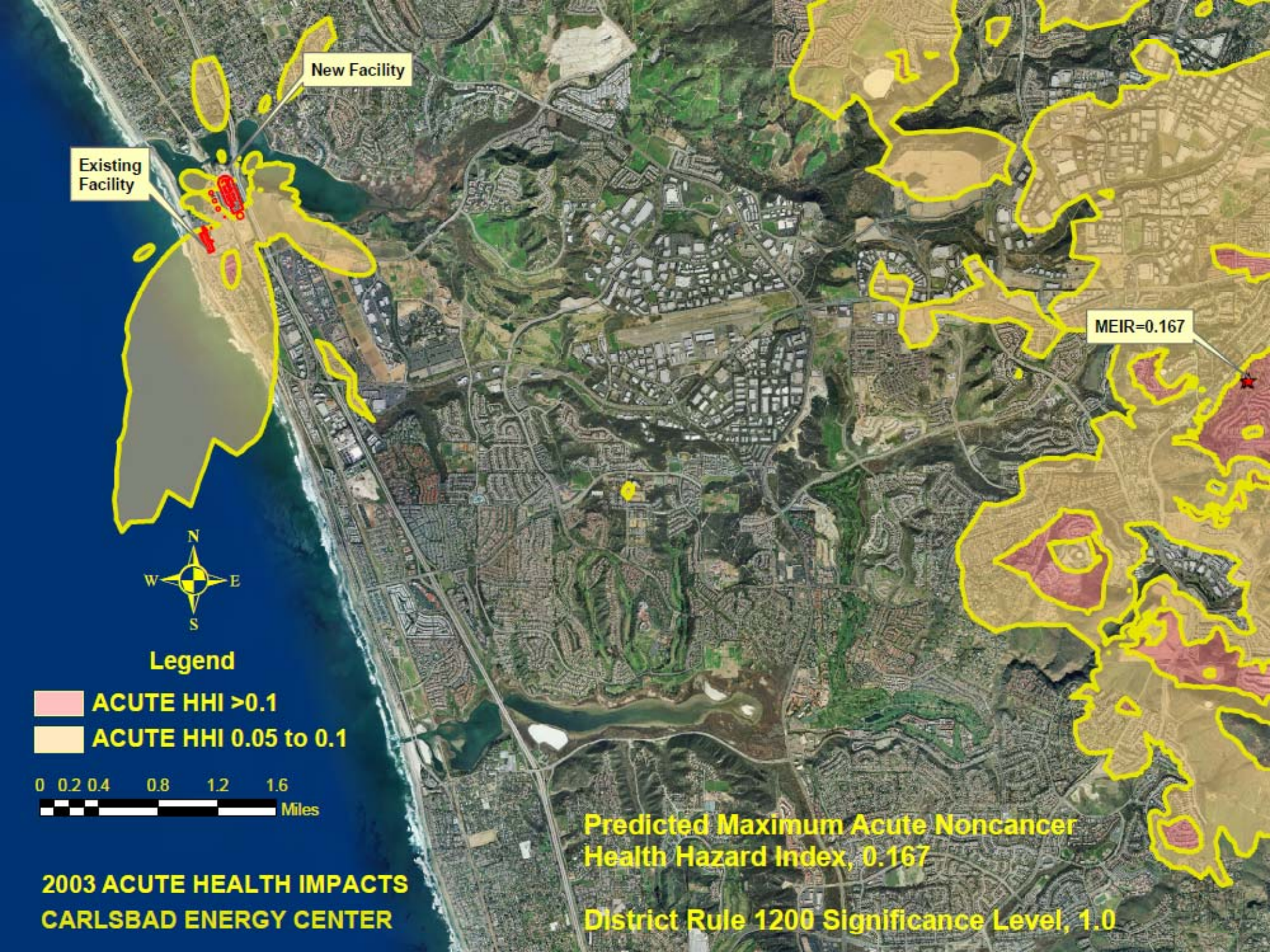
HRA Results

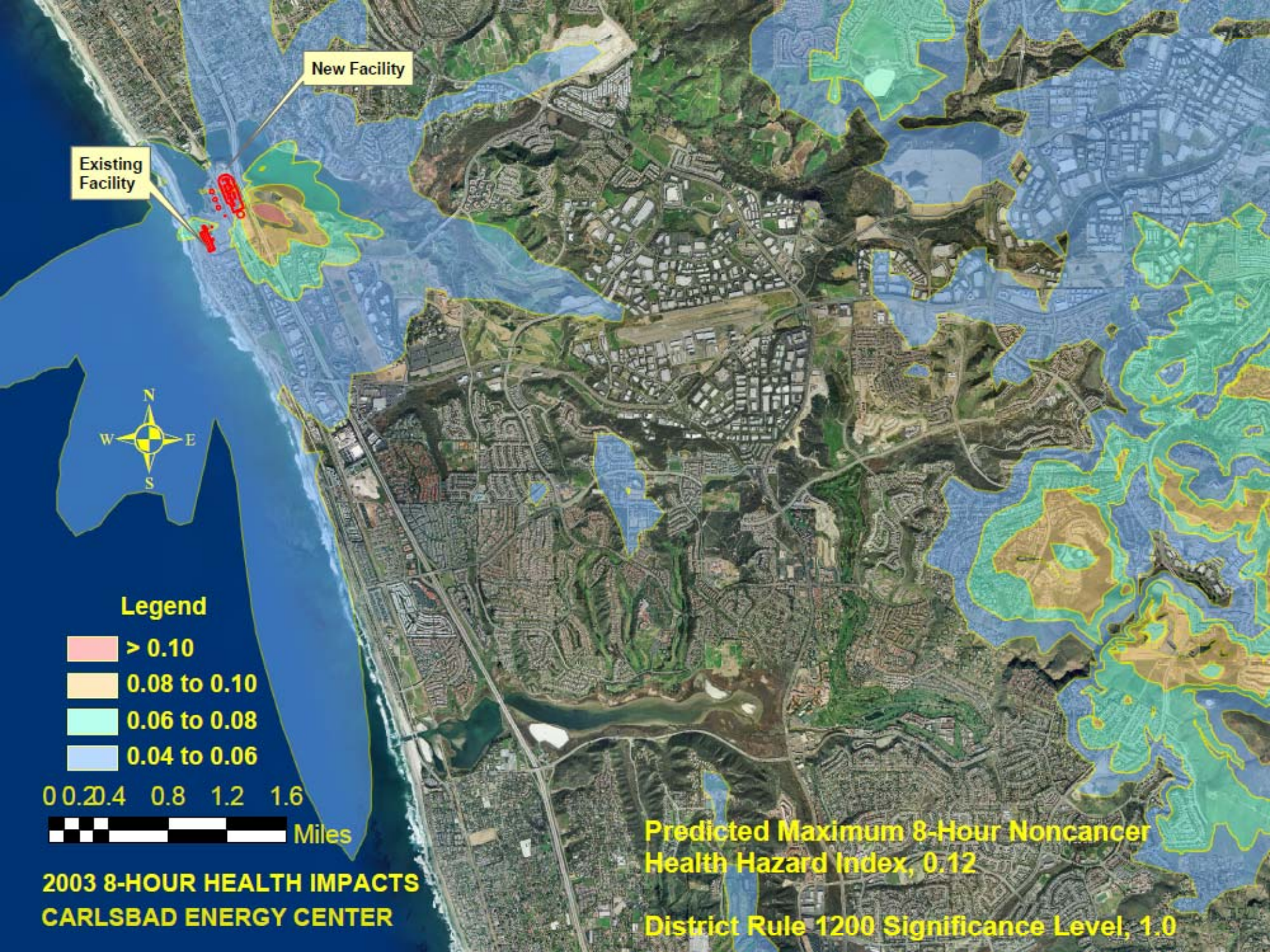
Category	Health Impact	Rule 1200 Significance Level
Maximum Incremental Cancer Risk – Resident (per million)	0.71	1.0 or 10 (with TBACT)
Maximum Incremental Cancer Risk – Worker (per million)	0.27	1.0 or 10 (with TBACT)
Total Chronic Noncancer Health Hazard Index - Resident	0.01	1.0
Total Chronic Noncancer Health Hazard Index - Worker	0.01	1.0
Total Acute Noncancer Health Hazard Index	0.16	1.0
Total 8-Hour Noncancer Health Hazard Index	0.12	1.0

HRA Conclusion

- Emissions of toxic air contaminants do not present a significant health risk


New Facility
PMI 1.22 per Million
Existing Facility
MEIR 0.71 per million
N
W
E
S
Legend
> 1.00 in a million
0.75 to 1.00 in a million
0.50 to 0.75 in a million
0.25 to 0.50 in a million
0 0.25 0.5 1 1.5 2 2.5
Miles
2005 CANCER RISK ISOPLETHS
CARLSBAD ENERGY CENTER
Predicted Maximum Incremental Cancer Risk:
Residential, 0.71 per million
Worker, 0.27 per million
District Rule 1200 Significance Level, 10.0 per million


New Facility
Existing Facility
MEIR=0.167
N
W
E
S
Legend
ACUTE HHI >0.1
ACUTE HHI 0.05 to 0.1
0 0.2 0.4 0.8 1.2 1.6
Miles
Predicted Maximum Acute Noncancer Health Hazard Index, 0.167
District Rule 1200 Significance Level, 1.0
2003 ACUTE HEALTH IMPACTS
CARLSBAD ENERGY CENTER


New Facility
Existing Facility
N
W
E
S
Legend
> 0.10
0.08 to 0.10
0.06 to 0.08
0.04 to 0.06
0 0.2 0.4 0.8 1.2 1.6
Miles
2003 8-HOUR HEALTH IMPACTS
CARLSBAD ENERGY CENTER
Predicted Maximum 8-Hour Noncancer
Health Hazard Index, 0.12
District Rule 1200 Significance Level, 1.0

New Facility
Existing Facility
N
W
E
S
Legend
> 0.007
0.005 to 0.007
0.003 to 0.005
0.001 to 0.003
0 0.2 0.4 0.8 1.2 1.6
Miles
2005 CHRONIC HEALTH IMPACTS
CARLSBAD ENERGY CENTER
Predicted Maximum Chronic Noncancer Health Hazard Index, 0.008
District Rule 1200 Significance Level, 1.0

AQIA—Rule 20.3 (d)(2)

- Criteria pollutants
  - Nitrogen Dioxide (NO_2)—NOx, Carbon Monoxide (CO), Particulate Matter (PM10 and PM 2.5), Sulfur Dioxide (SO_2)—SOx
- Standards
  - CA and federal ambient air quality standards (AAQS)
  - Significant Impact Levels (SILs)
- Background included

AQIA Criteria

- No new exceedances of an AAQS for periods less than annual (1-hour, 8-hour, 24-hour, etc.)

- For annual, no new exceedances or, if already an exceedance, impact less than SIL

AQIA Results—AAQS

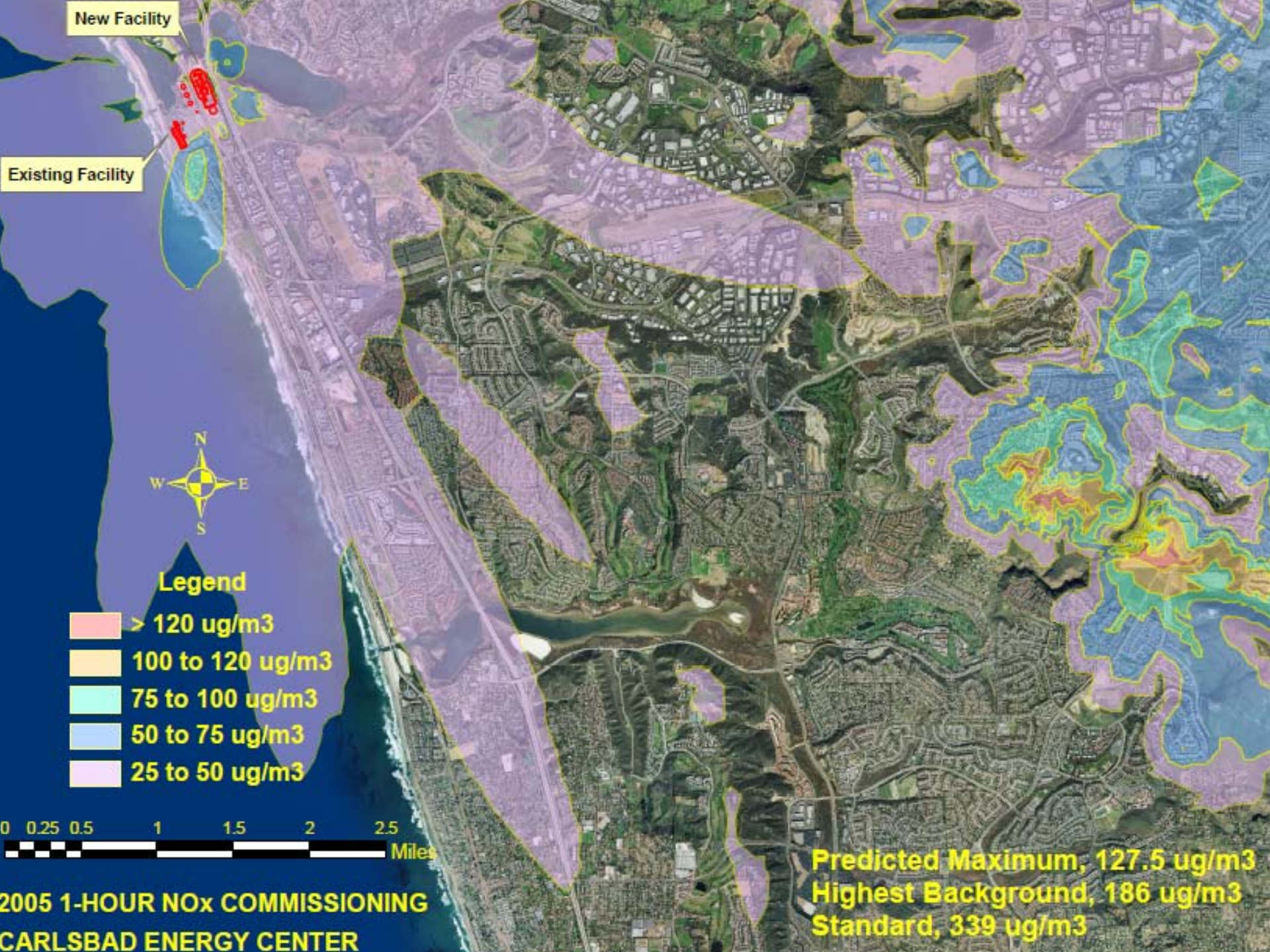
Pollutant	Averaging Time	Maximum Project Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	State Standard ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)
NO_2	1-hour	127.5	186	314	338	-
	Annual	0.1	23	23	56	100
SO_2	1-hour	4.3	110	114	650	-
	3-hour	2.0	79	81	-	1300
	24-hour	0.4	24	24	109	365
	Annual	0.0	10	10	-	80
CO	1-hour	3,228.0[a]	7210	10438	23,000	40,000
	8-hour	675.9[a]	4361	5037	10,000	10,000
PM_{10}	24-hour	1.2	44	45.2	50	150
	Annual	0.1	27	27	20	--
$PM_{2.5}$	24-hour	1.2	32.7	34	--	35
	Annual	0.1	14.1	14	12	15

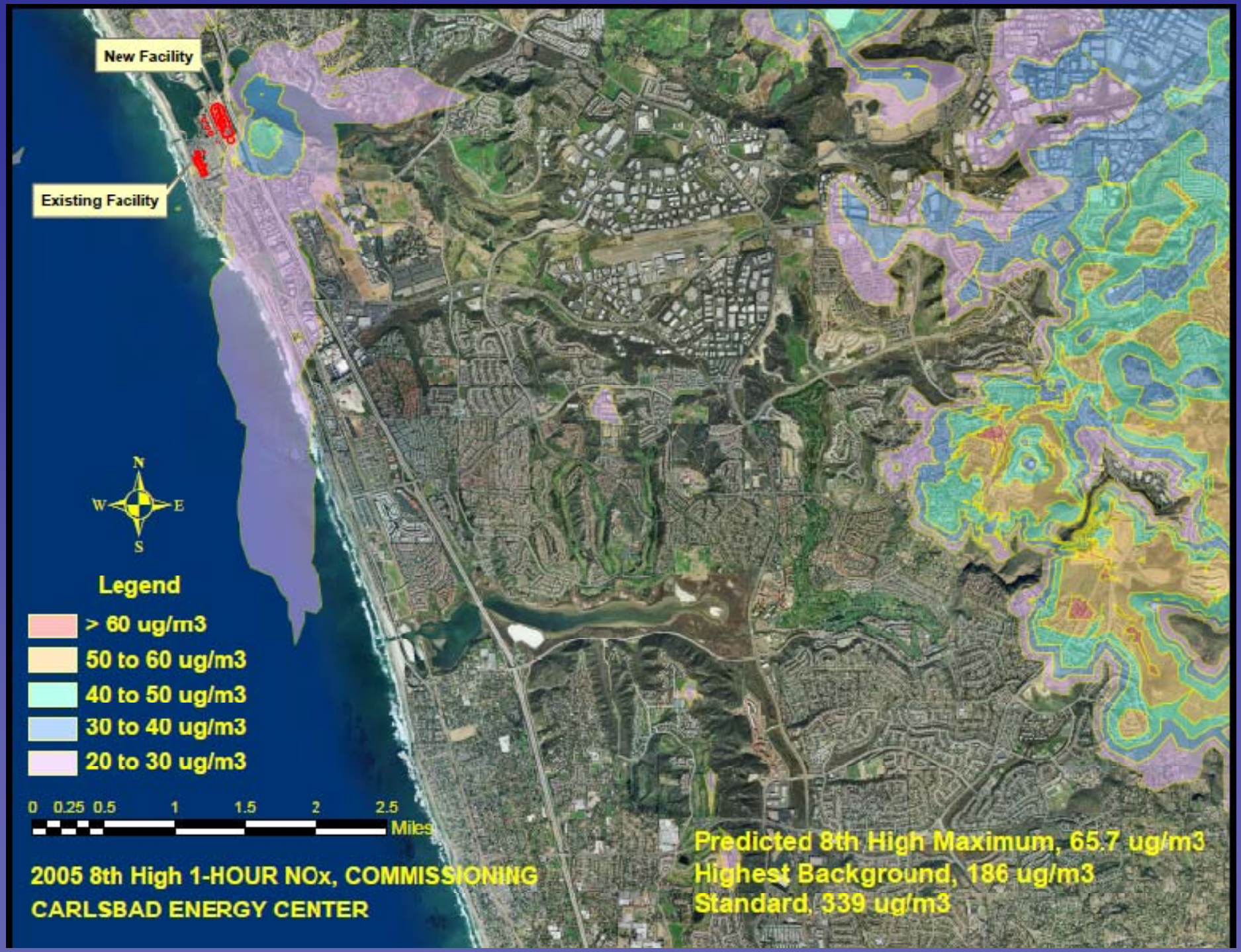
AQIA Results—SILs

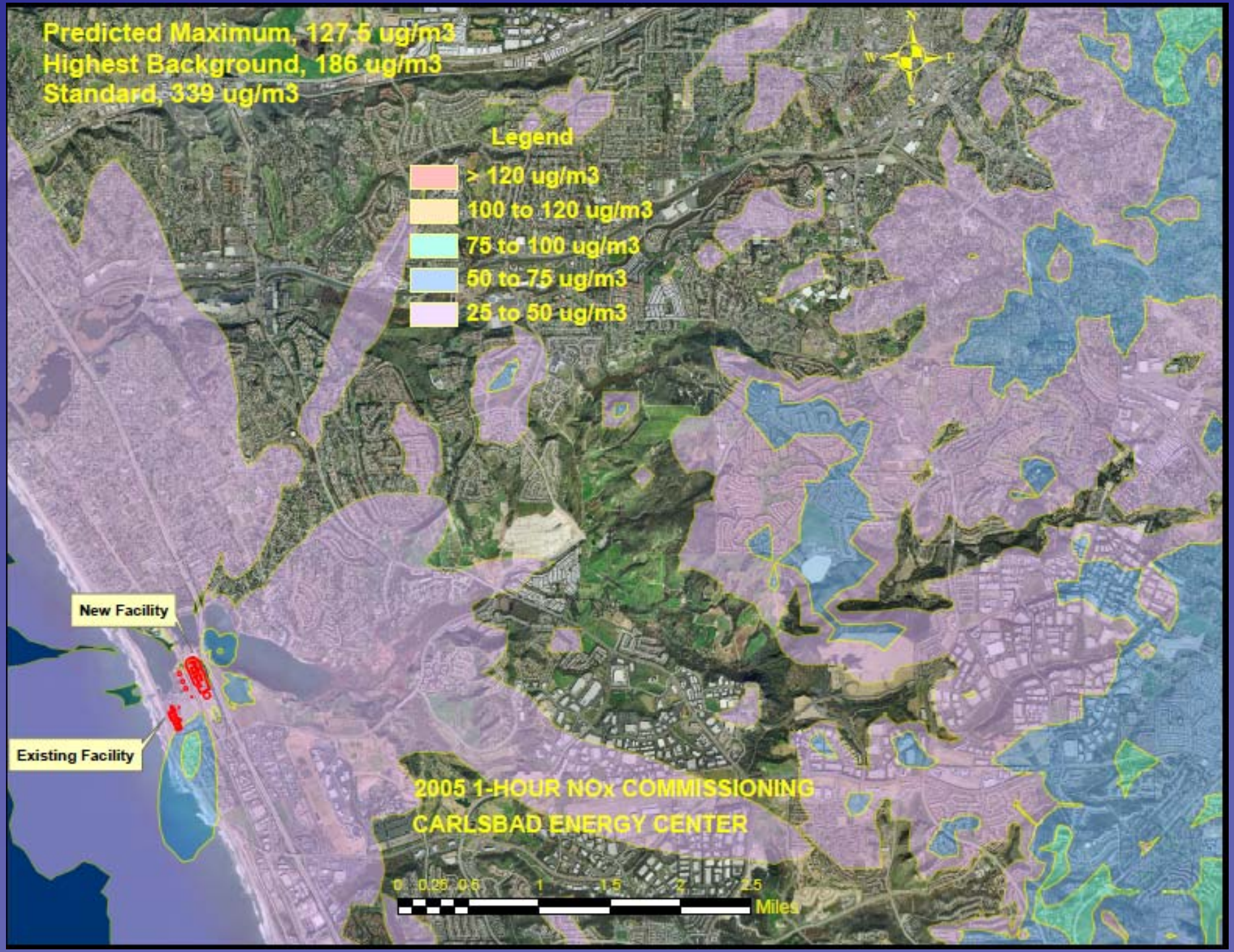
Pollutant	Averaging Time	Significant Impact Level, $\mu g/m^3$	Maximum Modeled Impact, $\mu g/m^3$	Exceed Significant Impact Level?
NO_2	Annual	1	0.1	No
SO_2	3-hour	25	2.0	No
	24-Hour	5	0.4	
	Annual	1	0.0	
CO	1-Hour	2000	1134	No
	8-Hour	500	236	
PM_{10}	24-Hour	5	1.2	No
	Annual	1	0.1	
$PM_{2.5}$	24-Hour	1.2–5	1.2	No
	Annual	0.3–1	0.1	

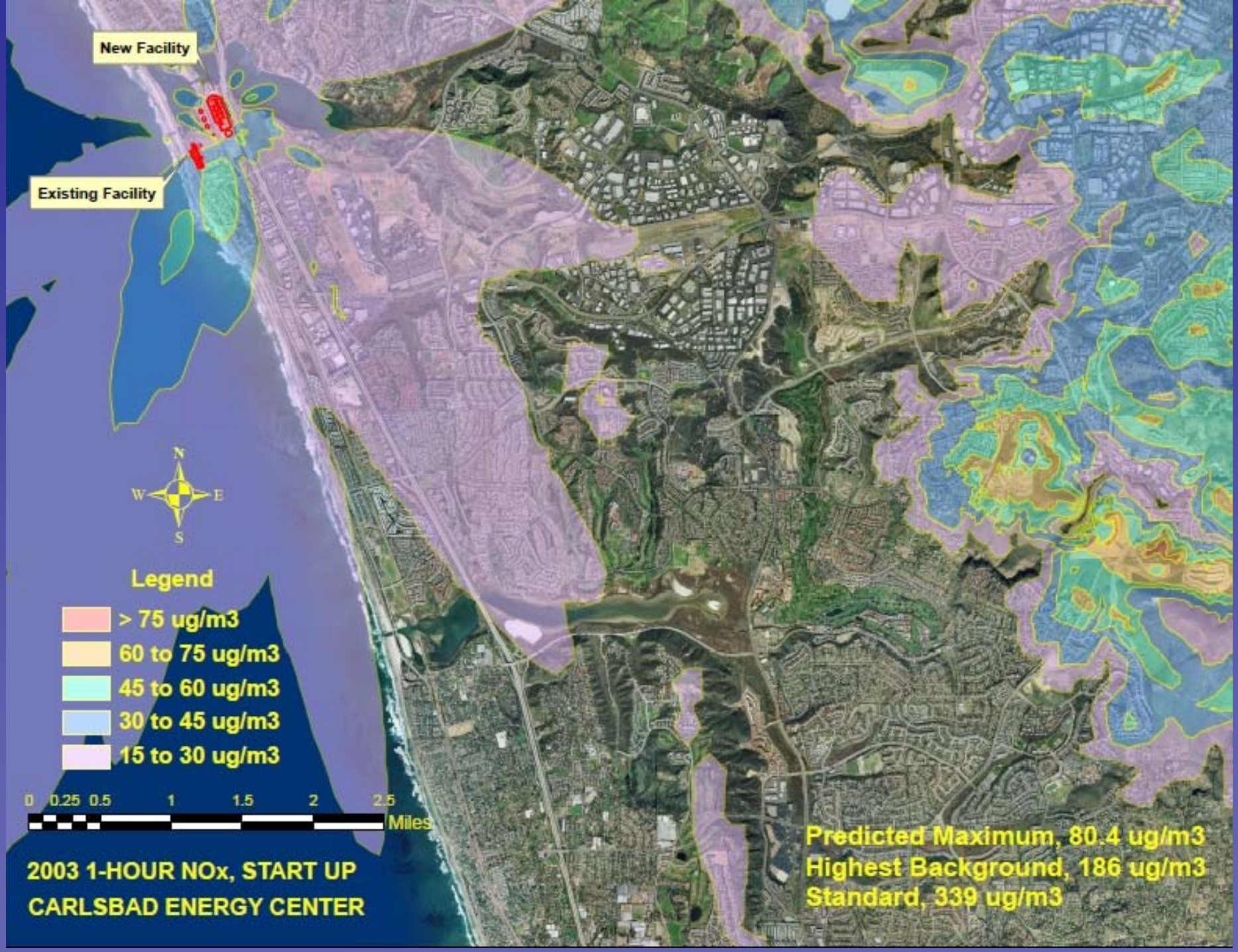
AQIA Conclusion

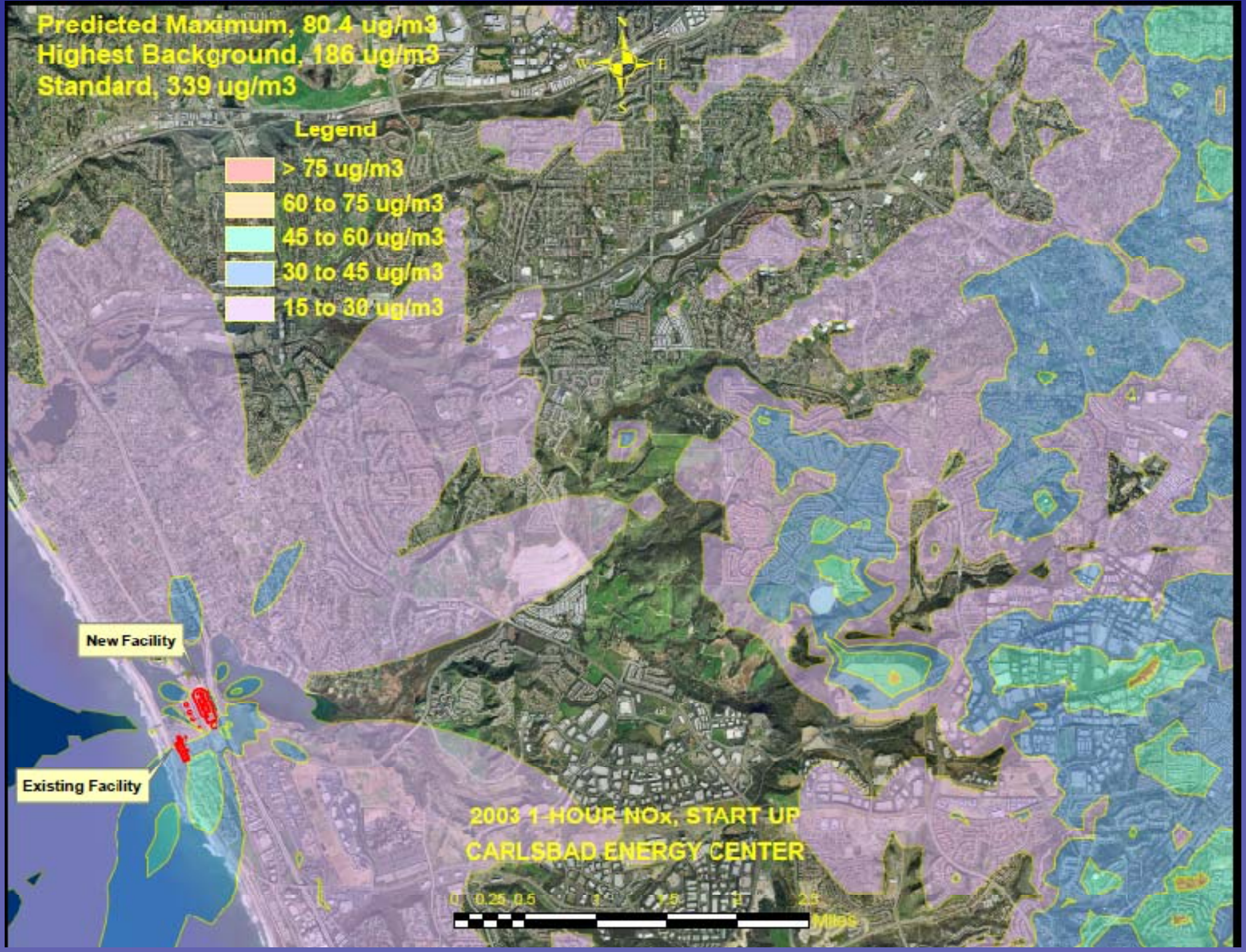
- Emissions of criteria pollutants do not present a significant health risk


New Facility
Existing Facility
N
W
E
S
Legend
> 120 ug/m3
100 to 120 ug/m3
75 to 100 ug/m3
50 to 75 ug/m3
25 to 50 ug/m3
0 0.25 0.5 1 1.5 2 2.5
Miles
Predicted Maximum, 127.5 ug/m3
Highest Background, 186 ug/m3
Standard, 339 ug/m3
2005 1-HOUR NOx COMMISSIONING
CARLSBAD ENERGY CENTER

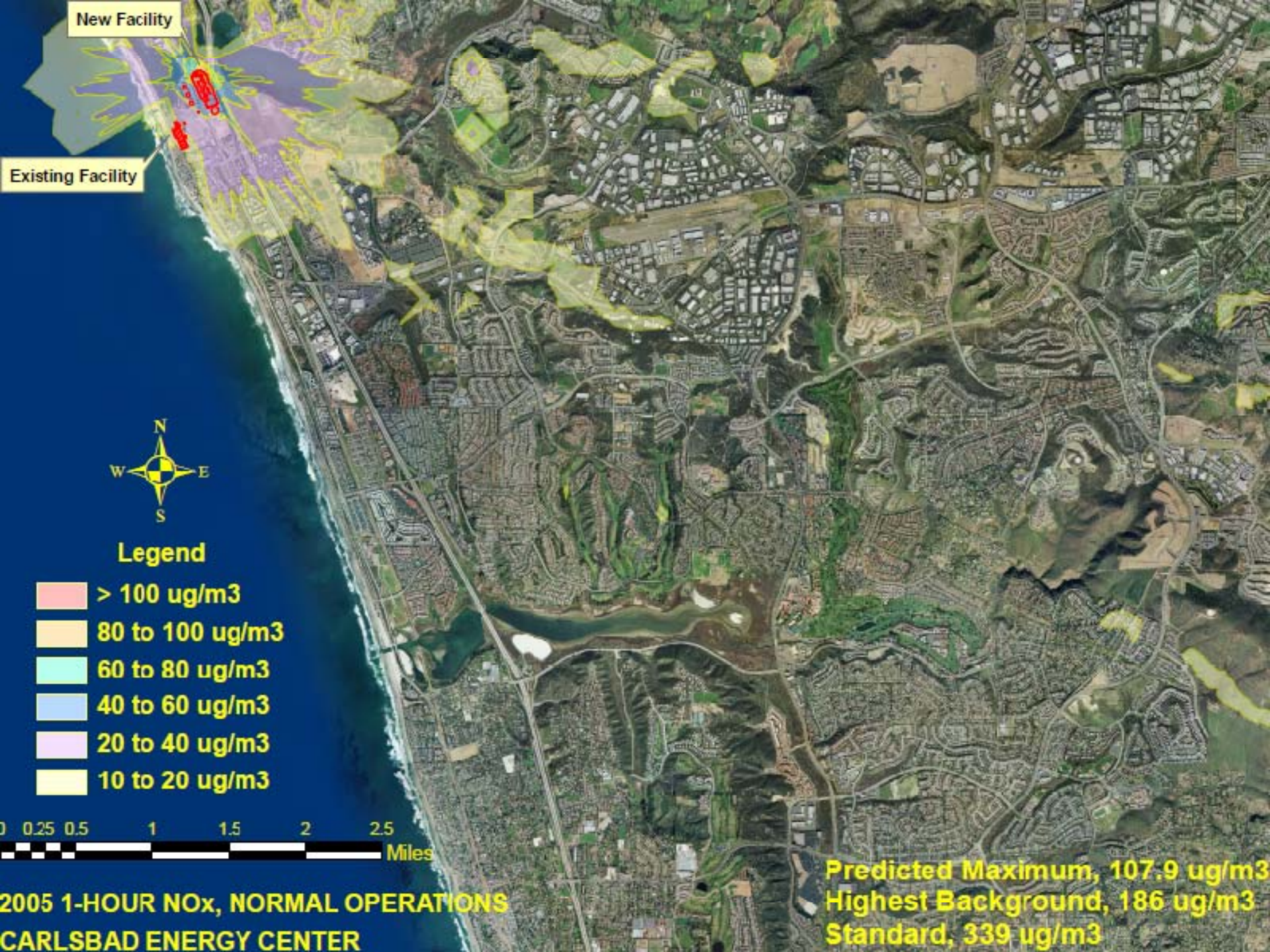

New Facility
Existing Facility
N
W
E
S
Legend
> 60 ug/m3
50 to 60 ug/m3
40 to 50 ug/m3
30 to 40 ug/m3
20 to 30 ug/m3
0 0.25 0.5 1 1.5 2 2.5
Miles
2005 8th High 1-HOUR NOx, COMMISSIONING
CARLSBAD ENERGY CENTER
Predicted 8th High Maximum, 65.7 ug/m3
Highest Background, 186 ug/m3
Standard, 339 ug/m3


Predicted Maximum, 127.5 ug/m3
Highest Background, 186 ug/m3
Standard, 339 ug/m3
Legend
> 120 ug/m3
100 to 120 ug/m3
75 to 100 ug/m3
50 to 75 ug/m3
25 to 50 ug/m3
New Facility
Existing Facility
2005 1-HOUR NOx COMMISSIONING
CARLSBAD ENERGY CENTER
0 0.25 0.5 1 1.5 2 2.5
Miles

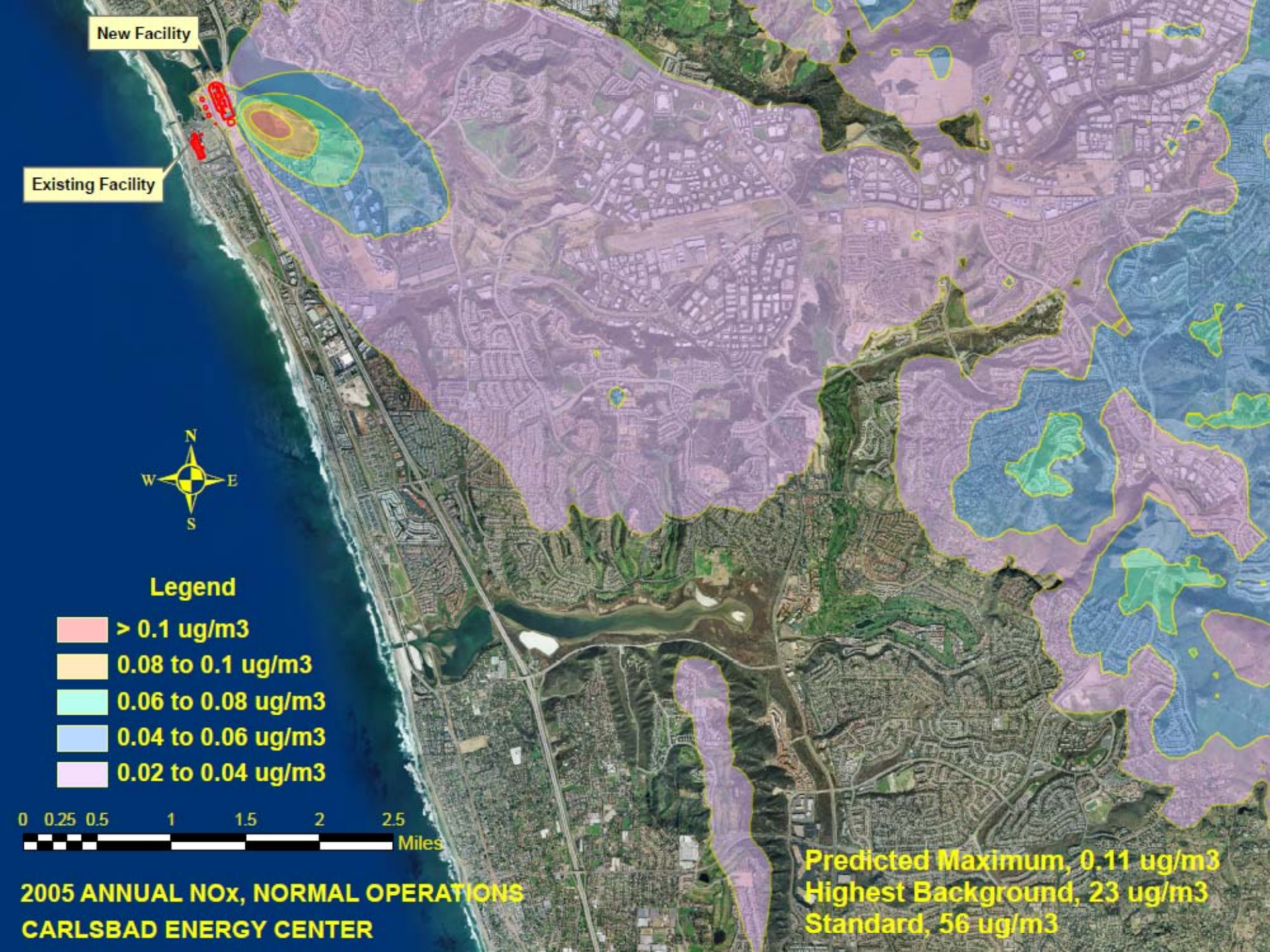

New Facility
Existing Facility
N
W
E
S
Legend
> 75 ug/m3
60 to 75 ug/m3
45 to 60 ug/m3
30 to 45 ug/m3
15 to 30 ug/m3
0 0.25 0.5 1 1.5 2 2.5
Miles
2003 1-HOUR NOx, START UP
CARLSBAD ENERGY CENTER
Predicted Maximum, 80.4 ug/m3
Highest Background, 186 ug/m3
Standard, 339 ug/m3


Predicted Maximum, 80.4 ug/m3
Highest Background, 186 ug/m3
Standard, 339 ug/m3
Legend
> 75 ug/m3
60 to 75 ug/m3
45 to 60 ug/m3
30 to 45 ug/m3
15 to 30 ug/m3
New Facility
Existing Facility
2003 1-HOUR NOx, START UP
CARLSBAD ENERGY CENTER
0 0.25 0.5 1 1.5 2 2.5
Miles

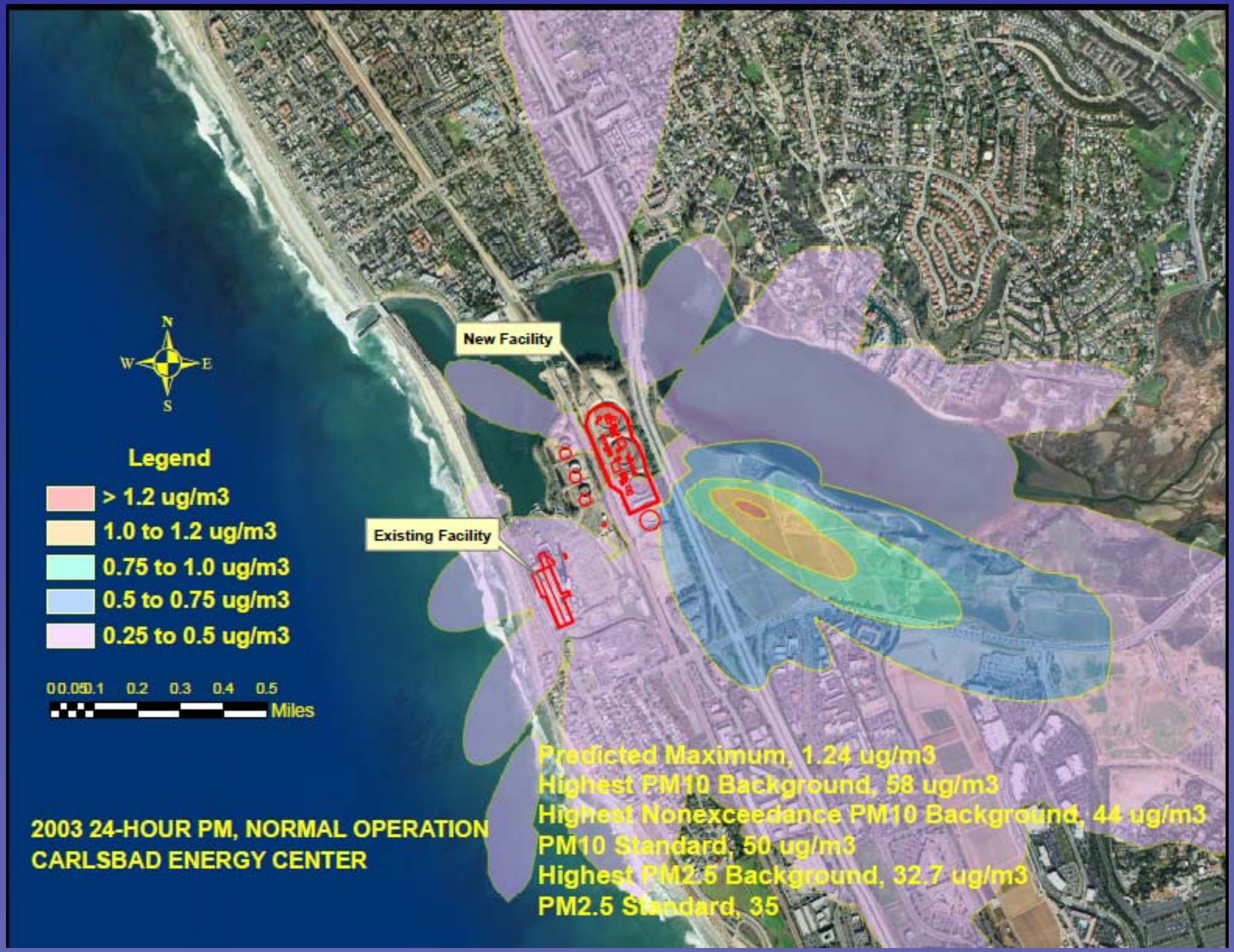
New Facility
Existing Facility
N
W
E
S
Legend
> 75 ug/m3
60 to 75 ug/m3
45 to 60 ug/m3
30 to 45 ug/m3
15 to 30 ug/m3
0 0.05 0.1 0.2 0.3 0.4 0.5
Miles
2003 1-HOUR NOx, START UP
CARLSBAD ENERGY CENTER
Predicted Maximum, 80.4 ug/m3
Highest Background, 186 ug/m3
Standard, 339 ug/m3

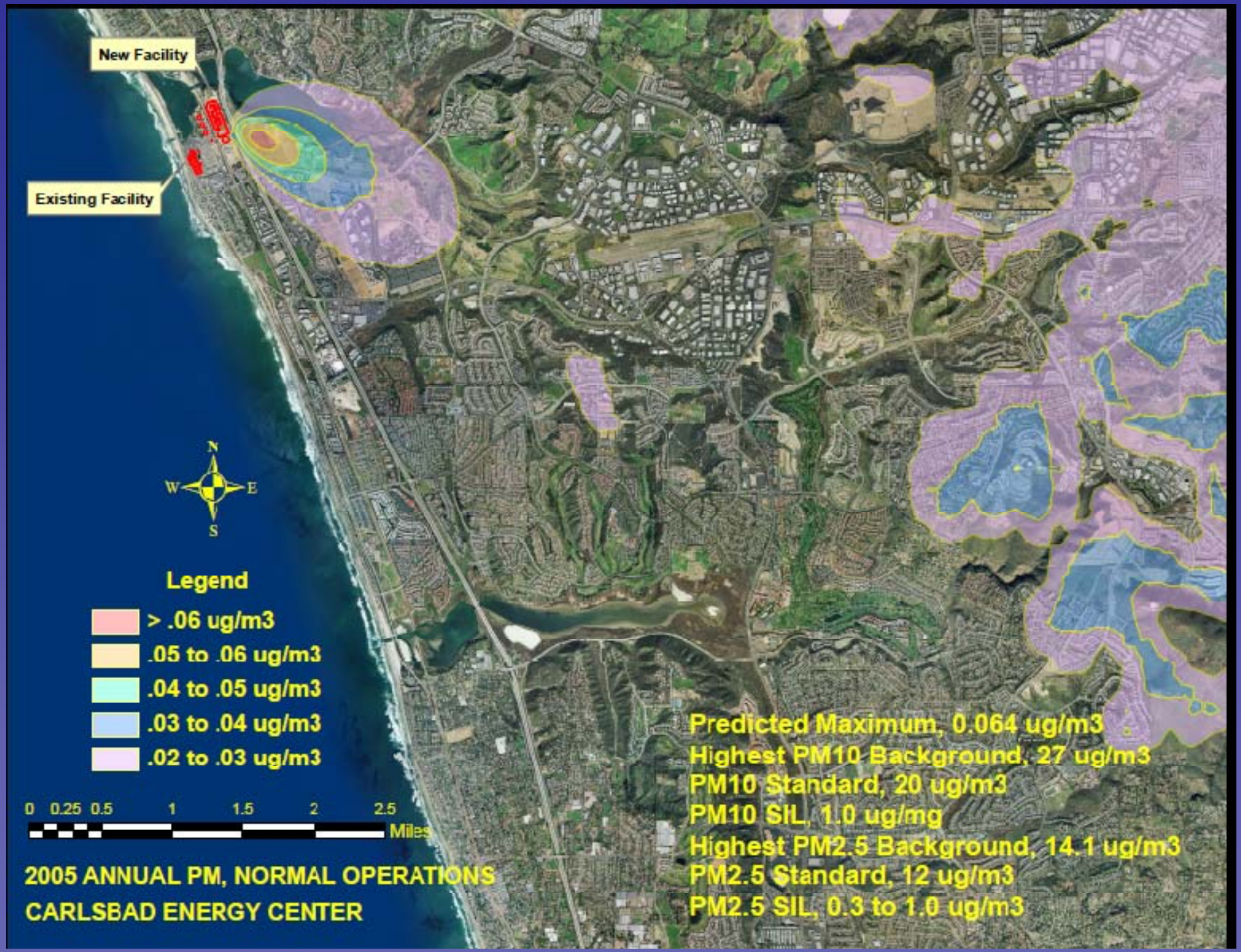

New Facility
Existing Facility
N
W
E
S
Legend
> 100 ug/m3
80 to 100 ug/m3
60 to 80 ug/m3
40 to 60 ug/m3
20 to 40 ug/m3
10 to 20 ug/m3
0 0.25 0.5 1 1.5 2 2.5
Miles
2005 1-HOUR NOx, NORMAL OPERATIONS
CARLSBAD ENERGY CENTER
Predicted Maximum, 107.9 ug/m3
Highest Background, 186 ug/m3
Standard, 339 ug/m3

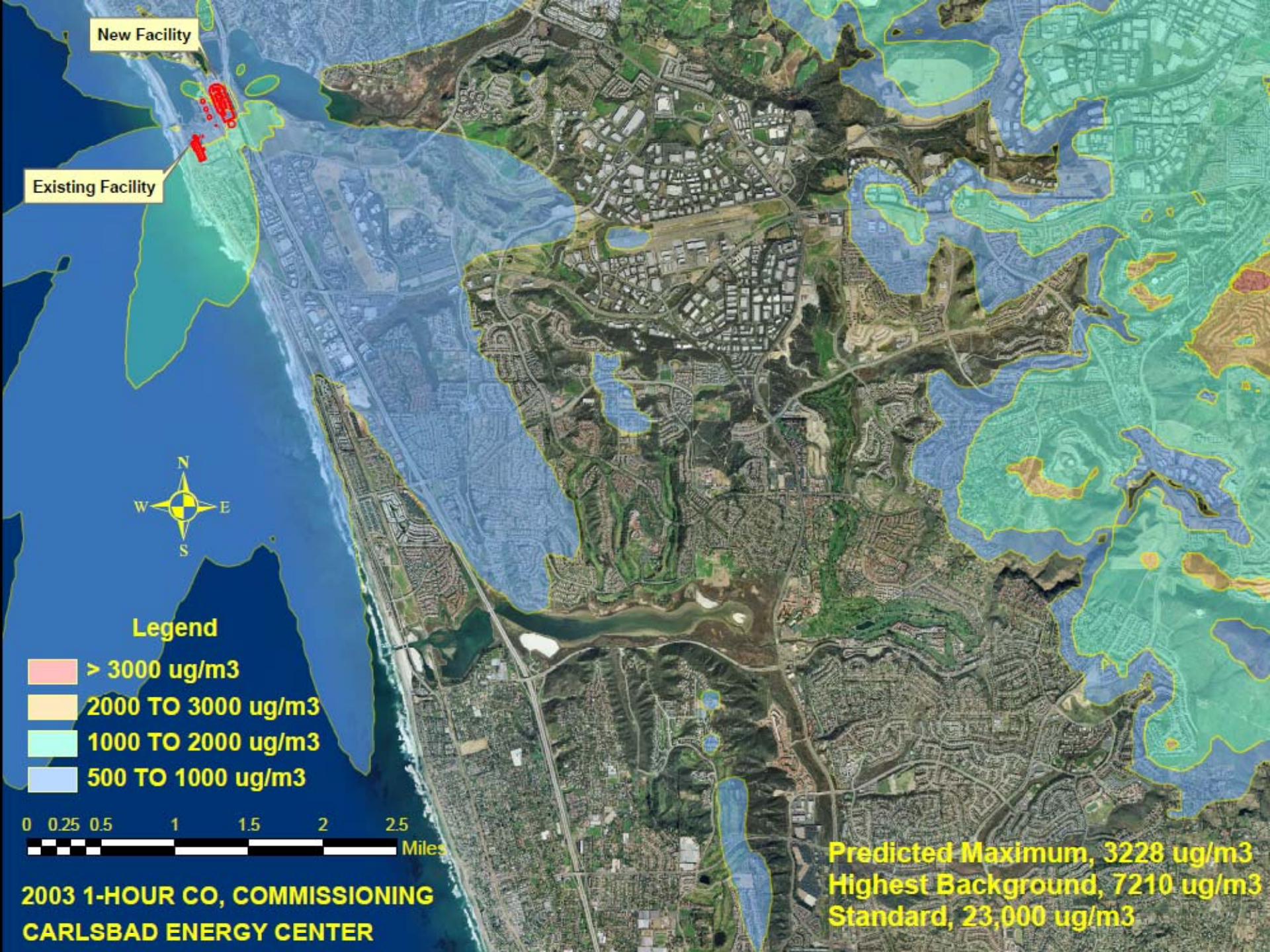
N
W
E
S
New Facility
Existing Facility
Legend
> 100 ug/m3
80 to 100 ug/m3
60 to 80 ug/m3
40 to 60 ug/m3
20 to 40 ug/m3
10 to 20 ug/m3
0 0.08 0.16 0.24 0.32 0.4
Miles
2005 1-HOUR NOx, NORMAL OPERATIONS
CARLSBAD ENERGY CENTER
Predicted Maximum, 107.9 ug/m3
Highest Background, 186 ug/m3
Standard, 339 ug/m3

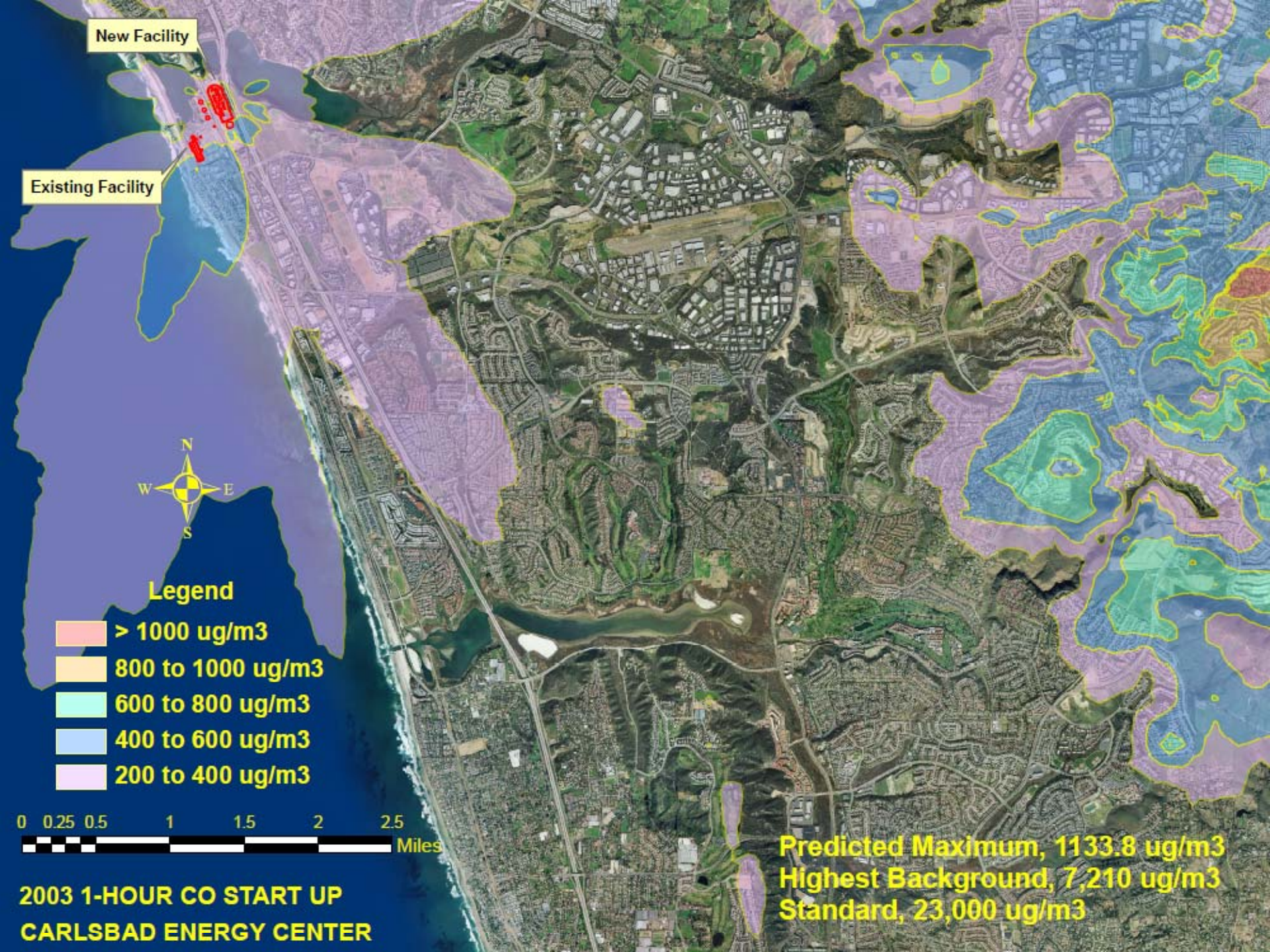

New Facility
Existing Facility
N
W
E
S
Legend
> 0.1 ug/m3
0.08 to 0.1 ug/m3
0.06 to 0.08 ug/m3
0.04 to 0.06 ug/m3
0.02 to 0.04 ug/m3
0 0.25 0.5 1 1.5 2 2.5
Miles
2005 ANNUAL NOx, NORMAL OPERATIONS
CARLSBAD ENERGY CENTER
Predicted Maximum, 0.11 ug/m3
Highest Background, 23 ug/m3
Standard, 56 ug/m3

New Facility
Existing Facility
N
W
E
S
Legend
> 1.2 ug/m3
1.0 to 1.2 ug/m3
0.75 to 1.0 ug/m3
0.5 to 0.75 ug/m3
0.25 to 0.5 ug/m3
0 0.25 0.5 1 1.5 2 2.5
Miles
Predicted Maximum, 1.24 ug/m3
Highest PM10 Background, 58 ug/m3
Highest Nonexceedance PM10 Background, 44 ug/m3
PM10 Standard, 50 ug/m3
Highest PM2.5 Background, 32.7 ug/m3
PM2.5 Standard, 35
2003 24-HOUR PM, NORMAL OPERATION
CARLSBAD ENERGY CENTER

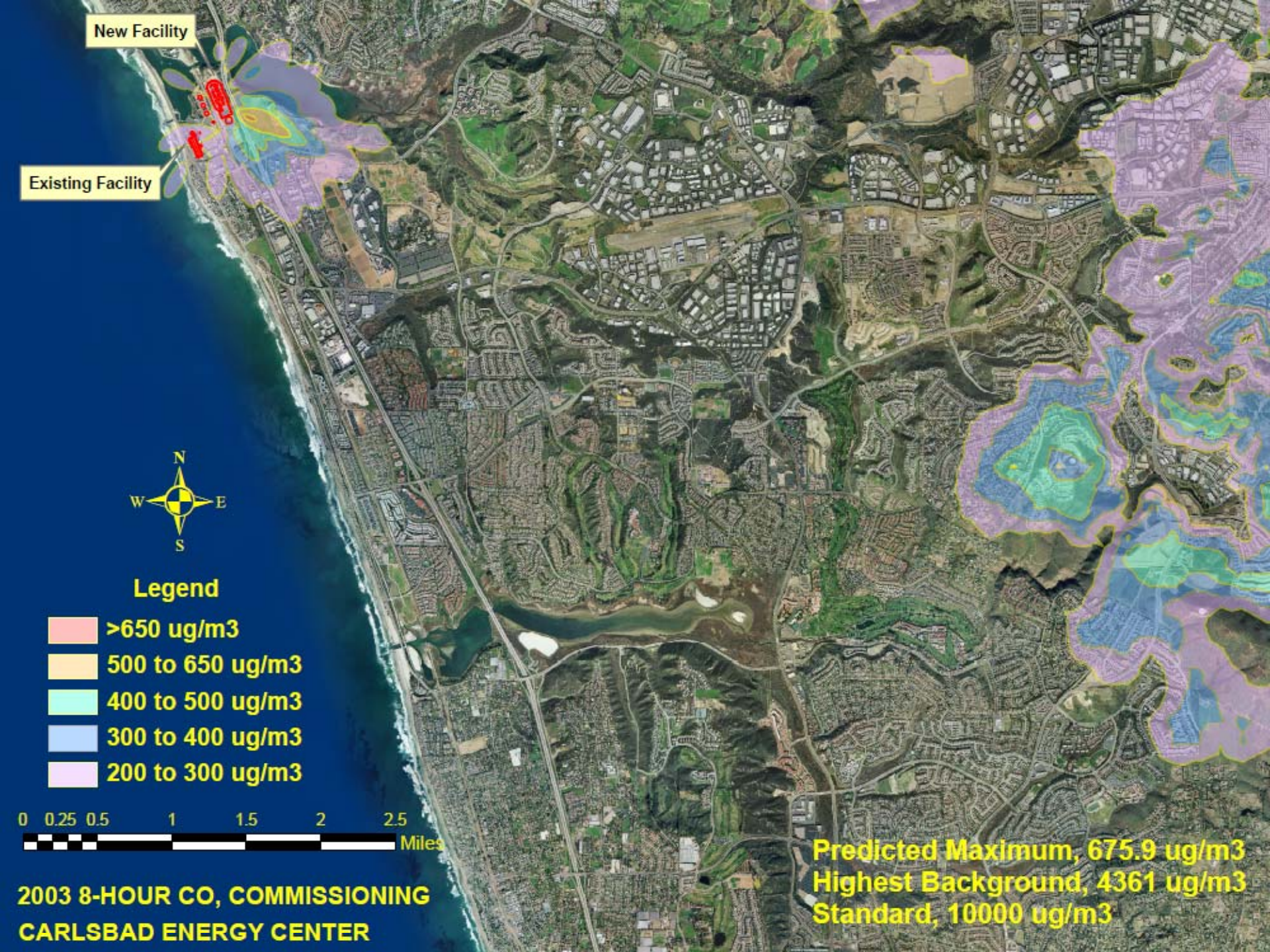

New Facility
Existing Facility
N
W
E
S
Legend
> 1.2 ug/m3
1.0 to 1.2 ug/m3
0.75 to 1.0 ug/m3
0.5 to 0.75 ug/m3
0.25 to 0.5 ug/m3
0 0.05 0.1 0.2 0.3 0.4 0.5
Miles
Predicted Maximum, 1.24 ug/m3
Highest PM10 Background, 58 ug/m3
Highest Nonexceedance PM10 Background, 44 ug/m3
PM10 Standard, 50 ug/m3
Highest PM2.5 Background, 32.7 ug/m3
PM2.5 Standard, 35
2003 24-HOUR PM, NORMAL OPERATION
CARLSBAD ENERGY CENTER


New Facility
Existing Facility
N
W
E
S
Legend
> .06 ug/m3
.05 to .06 ug/m3
.04 to .05 ug/m3
.03 to .04 ug/m3
.02 to .03 ug/m3
0 0.25 0.5 1 1.5 2 2.5
Miles
2005 ANNUAL PM, NORMAL OPERATIONS
CARLSBAD ENERGY CENTER
Predicted Maximum, 0.064 ug/m3
Highest PM10 Background, 27 ug/m3
PM10 Standard, 20 ug/m3
PM10 SIL, 1.0 ug/mg
Highest PM2.5 Background, 14.1 ug/m3
PM2.5 Standard, 12 ug/m3
PM2.5 SIL, 0.3 to 1.0 ug/m3


New Facility
Existing Facility
N
W
E
S
Legend
> 3000 ug/m3
2000 TO 3000 ug/m3
1000 TO 2000 ug/m3
500 TO 1000 ug/m3
0 0.25 0.5 1 1.5 2 2.5
Miles
2003 1-HOUR CO, COMMISSIONING
CARLSBAD ENERGY CENTER
Predicted Maximum, 3228 ug/m3
Highest Background, 7210 ug/m3
Standard, 23,000 ug/m3


New Facility
Existing Facility
N
W
E
S
Legend
> 1000 ug/m3
800 to 1000 ug/m3
600 to 800 ug/m3
400 to 600 ug/m3
200 to 400 ug/m3
0 0.25 0.5 1 1.5 2 2.5
Miles
Predicted Maximum, 1133.8 ug/m3
Highest Background, 7,210 ug/m3
Standard, 23,000 ug/m3
2003 1-HOUR CO START UP
CARLSBAD ENERGY CENTER

New Facility
Existing Facility
N
W
E
S
Legend
> 16 ug/m3
14 to 16 ug/m3
12 to 14 ug/m3
10 to 12 ug/m3
5 to 10 ug/m3
2 to 5 ug/m3
0 0.25 0.5 1 1.5 2 2.5
Miles
2003 1-HOUR CO NORMAL OPERATIONS
CARLSBAD ENERGY CENTER
Predicted Maximum 18.2 ug/m3
Highest Background 7201 ug/m3
Standard, 23,000 ug/m3


New Facility
Existing Facility
N
W
E
S
Legend
>650 ug/m3
500 to 650 ug/m3
400 to 500 ug/m3
300 to 400 ug/m3
200 to 300 ug/m3
0 0.25 0.5 1 1.5 2 2.5
Miles
2003 8-HOUR CO, COMMISSIONING
CARLSBAD ENERGY CENTER
Predicted Maximum, 675.9 ug/m3
Highest Background, 4361 ug/m3
Standard, 10000 ug/m3

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- 858-586-2750

END