Air Quality and Health Risk Assessments Technical Study

for the I-710 Corridor Environmental Impact Report / Environmental Impact Statement

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Acronyms

$\mu g/m^3$	micrograms per cubic meter
AAQS	Ambient Air Quality Standards
AATWG	Agency Air Technical Working Group
AERMET	AERMOD Meteorological Preprocessor
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AOI	Area of Interest
AP-42	Air Pollution emission factors compiled and assess by the EPA
AQ/HRA	Air Quality and Health Risk Assessments
AQMP	Air Quality Management Plan
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CARB (ARB)	California Air Resource Board
CCAR	California Climate Action Registry
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide Equivalent
CPTP	Clean Port Truck Program
DEIR	Draft Environmental Impact Report
DEIS	Draft Environmental Impact Statement
DPM	Diesel Particulate Matter
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration
FC	Freight Corridor
GCCOG	Gateway Cities Council of Governments
GHG	Greenhouse Gas
GIS	Geographic Information Systems
GP	General Purpose
GRP	General Reporting Protocol
GWP	Global Warming Potential
hr	Hour
H_2S	Hydrogen Sulfide
HRA	Health Risk Assessment
IPCC	International Panel on Climate Change
ITS	Intelligent Transportation Systems
JPA	Joint Powers Authority
lb	Pounds
LPS	Locally Preferred Strategy

MCS	Major Corridor Study
Metro	Los Angeles County Metropolitan Transportation Authority
mg/m^3	milligrams per cubic meter
MSAT	Mobile Source Air Toxics
MTA	Los Angeles County Metropolitan Transportation Authority
NAAQS	National Ambient Air Quality Standards
NB	Northbound
NEPA	National Environmental Policy Act
N_2O	Nitrous oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NOP	Notice of Preparation
O_3	Ozone
OEHHA	Cal/EPA Office of Environmental Health Hazard Assessment
Pb	Lead
PM	Particulate Matter
PM_{10}	Particulate Matter less than 10 microns in diameter
$PM_{2.5}$	Particulate Matter less than 2.5 microns in diameter
POLA	Port of Los Angeles
POLB	Port of Long Beach
ppm	parts per million
RECLAIM	Regional Clean Air Incentives Market
RTIP	Regional Transportation Improvement Program
RTP	Regional Transportation Plan
ROG	Reactive Organic Gases
SB	Southbound
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategy
SER	Standard Environmental Reference
SMAQMD	Sacramento Metropolitan Air Quality Management District
SO_2	Sulfur dioxide
SO_x	Oxides of sulfur
TAC	Toxic Air Contaminant
TDM	Transportation Demand Management
TSM	Transportation Systems Management
USEPA	United States Environmental Protection Agency
UPF	Ultrafine Particulates
VMT	Vehicle Miles Travelled
VOC	Volatile Organic Compounds

Executive Summary

This report presents the results of the Air Quality/Health Risk Assessment analyses for the Interstate 710 (I-710) Corridor Project (Project). The Executive Summary presents the general air quality, health risk, and greenhouse gas impacts from the Project Alternatives. Section ES.11 presents a brief summary overview of the results of the AQ/HRA/GHG analyses. Compared to the 2008 base year, key results for the communities along the I-710 freeway include:

- Cancer risk decreases in residential areas and at sensitive receptors (e.g., schools, hospitals, daycare and elder care centers, etc.) for all 2035 Project alternatives, with the greatest reductions generally in Project alternatives with a zero-emission freight corridor.
- Most vehicle exhaust emissions, including air toxics and inhalable particulate matter, and related impacts decrease for all 2035 Project Alternatives. The greatest reductions generally occurred in Project alternatives with a zero-emission freight corridor.
- Road dust lofted (entrained) into the air by passing vehicles on the I-710 freeway resulted in increased inhalable particulate matter levels in some areas very near to the I-710 freeway (generally less than 200 meters or 660 feet) compared to the 2008 baseline. However, these increases may be an artifact of the U.S. Environmental Protection Agency (U.S. EPA) calculation method for entrained road dust and are inconsistent with the South Coast Air Quality Management District's 2007 Air Quality Management Plan (AQMP) methodology and proposed 2012 AQMP method, which do not result in the growth of entrained dust seen in the U.S. EPA method. If re-entrained dust growth were excluded from the calculations, all of the project alternatives would reduce PM emissions as compared to 2008 baseline.
- Localized carbon monoxide and particulate matter impacts on local intersections would not cause exceedences of air quality standards and/or delay the timely attainment of such standards.
- All criteria pollutant single-segment peak-day construction emissions except NO_X were found to be lower that the SCAQMD significance thresholds. Construction emissions for the worst-case schedule (simultaneous construction of all segments) show greatest peak-day emissions during mainline widening/shifting. Phasing and scheduling could further reduce construction peak emissions.
- GHG emissions from the freight corridor build alternatives decrease as compared to the No Build alternative (Alternative 1) with Alternative 6B showing the largest reduction in GHG emissions (approximately 600,000 tonnes CO_2e/yr).
- $PM_{2.5}$ mortality and morbidity were analyzed qualitatively based on comparative analysis of total $PM_{2.5}$ emissions and near I-710 concentrations for the various alternatives. Overall, the public's exposure to $PM_{2.5}$-related morbidity and mortality health risks would generally decrease relative to the 2008 baseline; the exceptions would be some locations within 100 m to 300 m of the I-710 freeway and/or freight corridor, which generally would not have people present.
- Incremental ultrafine particulate (or UFP) impacts were qualitatively analyzed using exhaust $PM_{2.5}$ emissions as a surrogate. This analysis shows a decrease in the public's

exposure to ultrafine particulates for all 2035 Alternatives relative to the 2008 baseline, particularly on area freeways, arterials near the ports and even along the I-710.

The main report includes more details about these impacts and the methodologies used for assessing them. This report also includes extensive technical appendices.

The I-710, also known as the Long Beach Freeway, is a major north-south interstate freeway linking the Port of Los Angeles (POLA) and the Port of Long Beach (POLB) to Southern California and beyond. The I-710 Major Corridor Study (MCS), undertaken to address the I-710 capacity and mobility issues and to explore possible solutions for transportation improvements, was completed in March 2005 and identified a Locally Preferred Strategy (LPS) consisting of ten general purpose lanes next to four separated freight movement lanes. The Los Angeles County Metropolitan Transportation Authority (Metro or MTA), in a cooperative effort involving California Department of Transportation (Caltrans), the Gateway Cities Council of Governments (GCCOG), the Southern California Association of Governments (SCAG), the POLA, the POLB, and the I-5 Joint Powers Authority (JPA), are collectively known as the I 710 Corridor Project Funding Partners. They are overseeing the preparation of environmental analysis and documentation for the proposed I-710 Corridor Project, which includes improvements along the I-710 Corridor from Ocean Boulevard in the City of Long Beach to State Route 60 [SR-60] in East LA.

The purpose[1] of the proposed I-710 Corridor Project (also referred to as the Project or I 710 Project) is to:

- Improve air quality and public health
- Improve traffic safety
- Address design deficiencies
- Address projected traffic volumes
- Address projected growth in population, employment, and activities related to goods movement

The environmental impacts of the proposed project alternatives are assessed and disclosed in compliance with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Caltrans (the lead agency[2]) and Metro have initiated work on the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the proposed Project, the purpose of which is to inform the public and governmental decision-makers of possible environmental effects associated with the proposed Project and to describe the measures that would mitigate those effects.

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1 A full description of the Need and Purpose of the I-710 Corridor Project can be found in the Notice of Preparation (http://www.metro.net/projects_studies/I-710/images/710_NOP.pdf) and the I-710 Major Corridor Study Final Report (http://www.metro.net/projects_programs/final_report.htm).

2 Caltrans is the lead agency under CEQA. Under NEPA, the Federal Highway Administration's (FHWA's) responsibility for environmental review, consultation, and any other action required in accordance with applicable federal laws for this project is being carried out by Caltrans under its assumption of responsibility pursuant to 23 United States Code (USC) 327.

In support of the EIR/EIS and transportation conformity determination, ENVIRON conducted air quality and health risk assessments (AQ/HRA) to evaluate the incremental air quality and human health risk impacts associated with the proposed Project and project alternatives as compared to the baselines (i.e., 2008 Notice of Preparation baseline for CEQA and 2035 No Federal Action baseline for NEPA). The AQ/HRA for this Project consists of two parts, meeting two separate regulatory requirements:

- An analysis of air quality and human health risk impacts for the EIR/EIS document, consistent with CEQA/NEPA requirements.
- Intersection "hot-spot" analyses in support of the transportation conformity determination, consistent with federal and state transportation conformity requirements.

The various analyses and the methodologies used to carry out the analyses follow the April 2010 I-710 AQ/HRA Protocol[3] prepared by ENVIRON. The Air Quality / Health Risk Assessments (AQ/HRA) Working Group, comprised of Funding Partner representatives, oversaw the development of the I-710 AQ/HRA Protocol. In addition, an Agency Air Technical Working Group (or AATWG) was consulted during the preparation of the draft I-710 AQ/HRA Protocol. The AATWG included representatives from the U.S. Environmental Protection Agency (USEPA), California Air Resources Board (CARB), South Coast Air Quality Management District (SCAQMD), Federal Highways Administration (FHWA), Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA), U.S. Army Corps of Engineers, Los Angeles District, as well as Funding Partner representatives. ENVIRON gave several briefings were made to the Environmental Subject Working Group, Corridor Advisory Committee, Technical Advisory Committee, and Project Committee. The draft I-710 AQ/HRA Protocol was released for comments in March 2009. Revisions to the I-710 AQ/HRA Protocol, based on comments received in April 2009 and information from initial analyses, are described in the April 2010 Draft Final AQ/HRA Protocol. This Protocol is contained in Appendix A.

ES. 1 Project Study Area

The general I-710 Corridor Project study area includes the portion of the I-710 from Ocean Boulevard in Long Beach to SR-60, a distance of approximately 18 miles. Specific study areas may be established for individual analyses. For example, the study area for traffic analyses for the Project currently extends one mile east and west of the I-710 and includes freeway to freeway interchanges at I-405, SR-91, I-105, and I-5. Additionally, the traffic study examines intersections and roadway segments of key north/south and east/west arterials from Wilmington Avenue in the west to Lakewood Boulevard in the east[4]. Given the size of the I-710 Corridor Project and its impact on the region, incremental mobile source (traffic generated) emission impacts were assessed for the South Coast Air Basin (or SCAB), an Area of Interest (or AOI)[5], which is a sub-region of the SCAB that includes cities and communities along the I-710 freeway and the I-710 freeway itself (see Figure ES.1). For the AQ/HRA dispersion modeling analyses,

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[3] Protocol for the Air Quality and Health Risk Assessments (AQ/HRA) for the I-710 Corridor Environmental Impact Report / Environmental Impact Statement (EIR/EIS) (Draft Final), ENVIRON International Corporation, April, 2010.

[4] Freeway Traffic Operations Analysis Report (Draft); Prepared for Los Angeles County Metropolitan Transportation Authority; Prepared by URS; December 2, 2009.

[5] It should be noted that the Executive Summary does not discuss the results for the AOI; results for the AOI are discussed in the main report. See Figure 4.1 for a map of the AOI.

the American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD) dispersion model and a coarse receptor grid was used to determine a zone of impact of the emissions from the I-710 freeway itself. This modeling zone of impact was generally the size of the general I-710 Study Area (see Figure ES.1) and smaller than the Area of Interest.

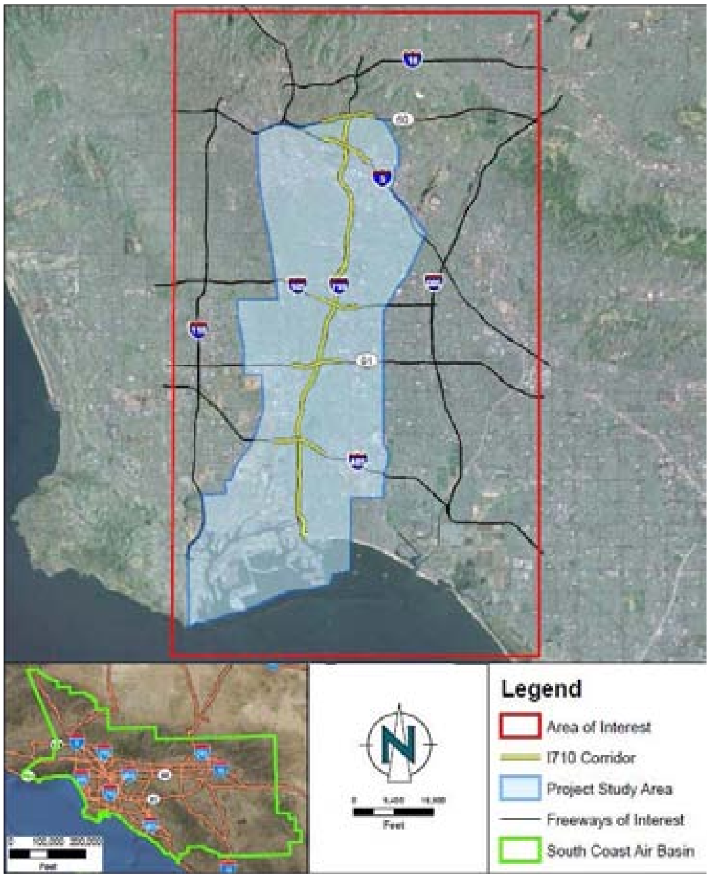

Figure ES.1 South Coast Air Basin, Air Quality Area of Interest, General I-710 Project Study Area, and I-710 Freeway

ES.2 Project Baselines

The AQ/HRA performed for any projects under CEQA/NEPA are conducted for the changes (i.e., increments) in project-related emissions, air quality impacts, and health risks relative to a baseline condition. Therefore, identifying the baseline condition is an important step in the EIR/EIS process.

Furthermore, it is important to note that the definition of baseline differs under CEQA and NEPA as discussed below:

> **The CEQA Baseline** represents existing, current conditions, defined to be the conditions at the time the Notice of Preparation (NOP) was released. Therefore, the CEQA baseline represents project-specific conditions in the year 2008 (e.g., traffic conditions on the I-710 and selected roadways in the year 2008).

The NEPA Baseline represents conditions in a future year where no federal funds were used for the Project. In this case, the "No Build Alternative" in the year 2035 (also known as Alternative 1) represents the NEPA baseline.

ES.3 Project Alternatives

The AQ/HRA evaluated the identified project alternatives compared to these baselines in the analysis year of 2035. A multidisciplinary technical team developed the alternatives to achieve the I-710 Corridor Project purposes. Various committees involved in the I-710 Corridor Project community participation framework reviewed the alternatives. The Alternative Screening process for this Project recommended that three 2035 build alternatives (Alternative 5A, 6A, 6B) be evaluated in the EIR/EIS along with Alternative 1, the 2035 No Build Alternative[6]. Subsequently in late 2010, the Funding Partners added a fourth build alternative (Alternative 6C). Section 1.4 of the main report describes these alternatives in detail; Figure ES.2 summarizes the alternatives.

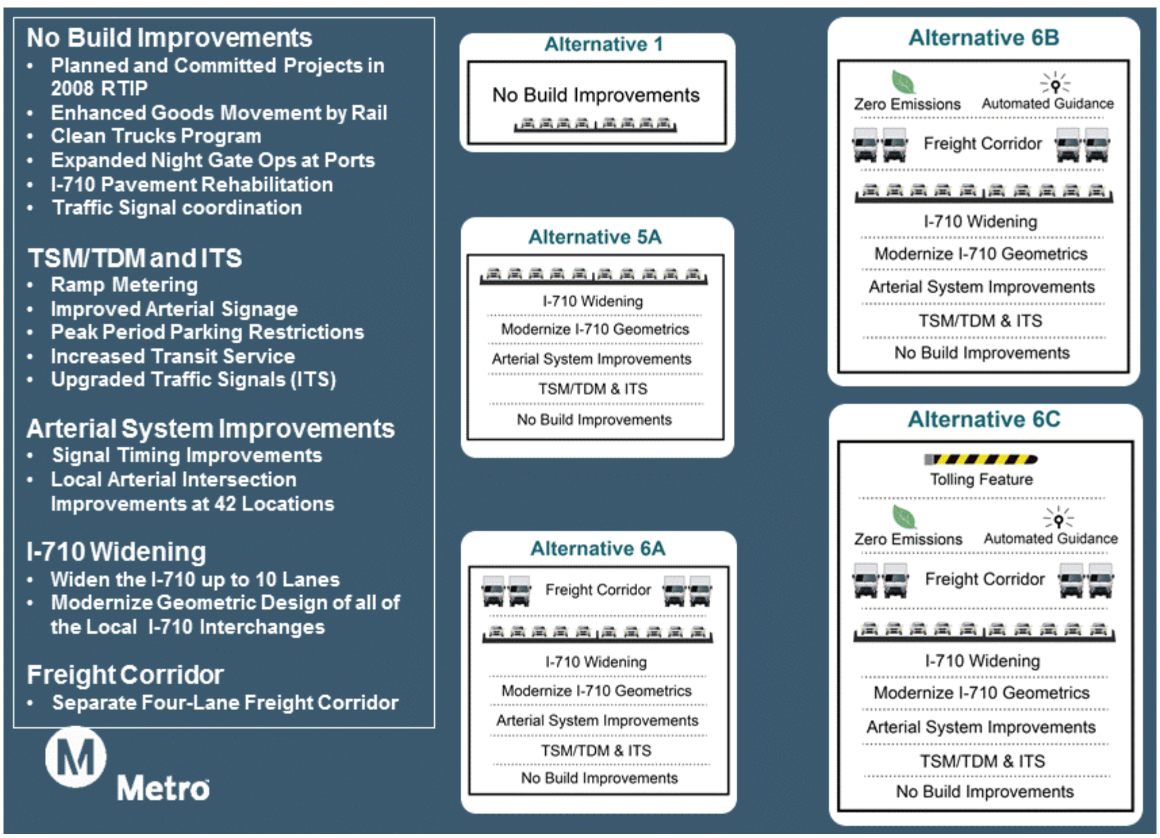

Figure ES.2 I-710 Corridor Project's 2035 Alternatives

ES.4 Scope of AQ/HRA

As mentioned earlier, the Project is a joint venture of several agencies associated with transportation and goods movement in the greater Los Angeles area and the subject of great interest to the local communities and other stakeholders involved in the I-710 Sustainable

[6] Technical Memorandum – Alternatives Screening Analysis (Final); Prepared for Los Angeles County Metropolitan Transportation Authority; Prepared by URS; May 29, 2009.

Communities Strategy (SCS) and other related studies. Metro, Caltrans and the other Funding Partners recognized that stakeholders wanted special analyses beyond the standard Caltrans analyses typically done for roadway/freeway projects (as described in Caltrans' Standard Environmental Reference at www.dot.ca.gov/ser/vol1/sec3/physical/ch11air/chap11.htm). Thus, additional special Project analyses over and above the standard analyses done for freeway projects were conducted because of the unique goods movement component of the Project and the air quality purpose of the Project. The various stakeholders wanted these special Project analyses because of their concern over the proportionately high volume of diesel-powered trucks serving the ports and surrounding logistics related activities. The community's perception is that these trucks generate higher levels of emissions, which are a cause of increased health impacts on the communities surrounding the I-710,

NOTE: Multiple metrics must be used to assess the AQ/HRA impacts of the project alternatives. A single metric cannot, and should not, be used to evaluate the full AQ/HRA impacts of any project alternative. The results of the different analyses should be considered together to give a comprehensive understanding of project AQ/HRA impacts.

Figure ES.3 below presents a summary of the analyses conducted for this Project, including those done for a typical roadway project EIR/EIS and additional analyses done for the Project.

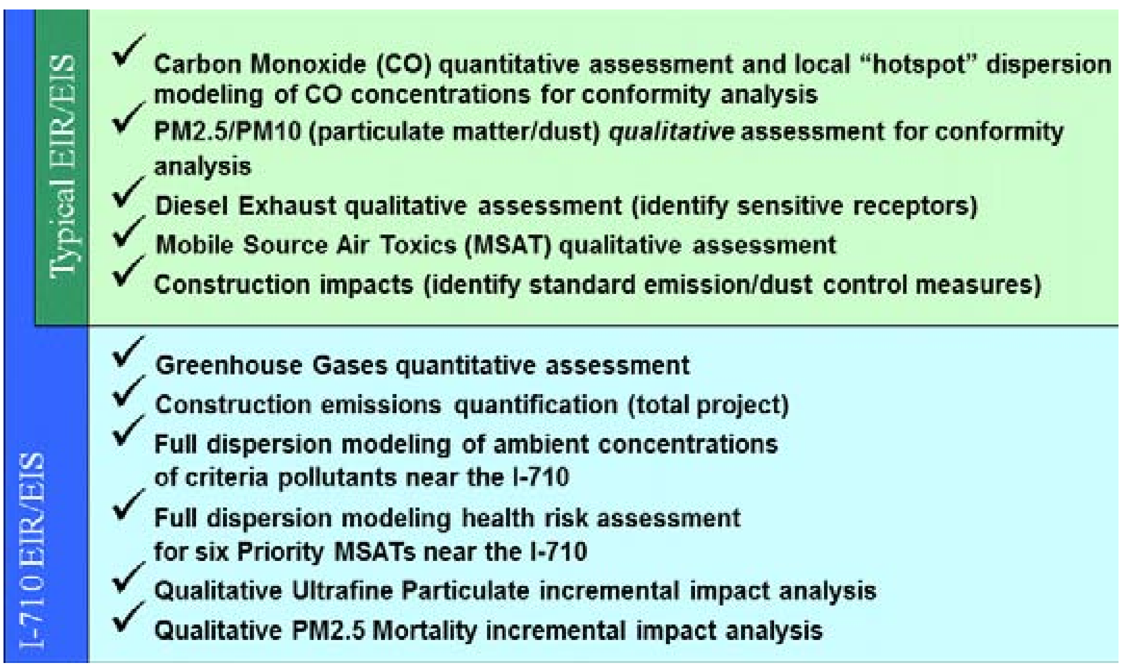

Figure ES.3 Summary of AQ/HRA/GHG Analyses for the I-710 Corridor Project

The Executive Summary presents the general air quality, health risk, and greenhouse gas impacts from the Project. The main report includes more details about these impacts and the methodologies used for assessing them. Section ES.11 presents a brief summary overview of the results of the AQ/HRA/GHG analyses.

ES.5 South Coast Air Basin and Area of Interest (AOI) Air Emissions Impacts

This section presents a summary of the results of the incremental emissions impacts of the proposed I-710 project alternatives based on the I-710 Traffic Model and applicable emission factors. The I-710 Traffic Model produces information along traffic "links" (which represent one or more roadway segments) throughout the South Coast Air Basin (and beyond). Incremental emission impacts are calculated for mobile source air toxics (MSAT) including diesel particulate matter (DPM) and criteria pollutants (ozone precursors such as oxides of nitrogen (NOx) and reactive organic gases (ROG), particulate matter less than 10 microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$), and other gases). The incremental emission impacts are calculated for the entire South Coast Air Basin, the Area of Interest around the AOI, and along the I-710 freeway itself (mainline and, if applicable, the proposed freight corridor).

ES.5.1 Mobile Source Air Toxics (MSAT) Incremental Emissions Impacts Compared to the 2008 Baseline

Toxic air contaminants (TACs) emissions are components of total organic gas (TOG) emissions (gas-phase TACs) and PM_{10}/$PM_{2.5}$ emissions (particle-phase TACs) produced by vehicles (autos and trucks) powered by internal combustion engines (mobile source emissions). Emissions of individual TACs were calculated by applying speciation profiles from the California Air Resources' Board's (CARB) speciation database[7] to the TOG and PM_{10}/$PM_{2.5}$ emissions. There are numerous TACs in mobile source emissions as per the ARB speciation database. However, Caltrans Standard Environmental Reference (SER) and Federal Highway Administration (FHWA) memorandum titled "Interim Guidance on Air Toxic Analysis in NEPA Documents" and its Update[8] both reference the 21 Mobile Source Air Toxics (MSAT) identified by the United States Environmental Protection Agency (USEPA).[9] In consultation with Caltrans, the Lead Agency for this Project, ENVIRON analyzed the six "priority" MSAT as discussed below.

In March 2001, EPA issued its first MSAT rule, 40 CFR Parts 80 and 86 - Control of Emissions of Hazardous Air Pollutants From Mobile Sources; Final Rule, March 2001 (http://www.epa.gov/EPA-AIR/2001/March/Day-29/a37.htm), which identified 21 MSAT as being hazardous air pollutants that required regulation. A subset of six MSAT was identified as having the greatest influence on human health. In February 2007 EPA issued a second MSAT rule, which generally supported the findings in the first rule and recommended that acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter as having the greatest influence on health. As presented in the I-710 EIR/EIS AQ/HRA protocol (released March 2009) and agreed on by the AQ/HRA Working Group and the Agency Air Technical Working Group (AATWG), the I-710 AQ/HRA evaluates the six priority MSAT identified in the first MSAT rule. The September 2009 FHWA guidance references the newest seven MSAT. The Lead Agency confirmed use of original six priority MSAT as the protocol was completed and the analyses were well underway before the new guidance was issued. Thus, the six priority MSAT analyzed in the I-710 AQ/HRA are:

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7 Available at http://www.arb.ca.gov/ei/speciate/speciate.htm.
8 Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents, FHWA, September 2009.
9 Available at http://www.epa.gov/otaq/regs/toxics/toxicfrm.pdf.

- Diesel exhaust (particulate matter and organic gases)
- Benzene
- 1,3-Butadiene
- Acetaldehyde
- Formaldehyde
- Acrolein

Emission tables for the incremental emission impact of all of the MSAT (for the SCAB, Area of Interest, and the I-710 freeway itself) are included in Section 4.3.5.1 for all 2035 Alternatives compared to 2008 Baseline emissions. Emissions of all six priority MSAT decrease for all 2035 Alternatives compared to the 2008 baseline, despite forecast increases in vehicle miles of travel (VMT) in 2035 compared to 2008. This decrease in MSAT emissions is direct result of improved vehicle technology in the future years because of stricter regulations or programs such as CARB's diesel truck regulations and the San Pedro Bay Ports' Clean Air Action Plan. As an example, Table ES.1 presents a summary of the results for DPM, the dominant contributor to cancer risk. Table ES.1 shows the DPM emissions for the 2035 Alternatives as a fraction of the 2008 DPM emissions Area of Interest emissions.

Table ES.1 2035 Alternatives Comparison to 2008 DPM Emissions (lbs/day)

	SCAB	Area of Interest	I-710 Freeway Itself*
Alt. 1	-23,000	-5,500	-390
Alt. 5A	-23,000	-5,400	-350
Alt. 6A	-23,000	-5,400	-230
Alt. 6B	-23,000	-5,600	-460
Alt. 6C	-23,000	-5,600	-430

*For all alternatives with a freight corridor (i.e. Alternatives 6A, 6B, and 6C), the "I-710 freeway itself" will include the freight corridor also, where applicable

Overall 2035 DPM emissions in the AOI are about 80% lower than the 2008 DPM emissions, with small variations among the alternatives. Overall DPM emissions for the entire I-710 freeway are also lower in the 2035 alternatives as compared to the 2008 baseline (40% to 76% lower), although the variations are greater (40% lower in Alternative 6A and greater than 70% lower in Alternatives 6B and 6C) . Along the I-710, Alternative 6A shows the smallest reduction in DPM emissions due to the increased truck traffic with the introduction of the freight corridor; Alternatives 6B and 6C have greater reductions due to the zero emission freight corridor.

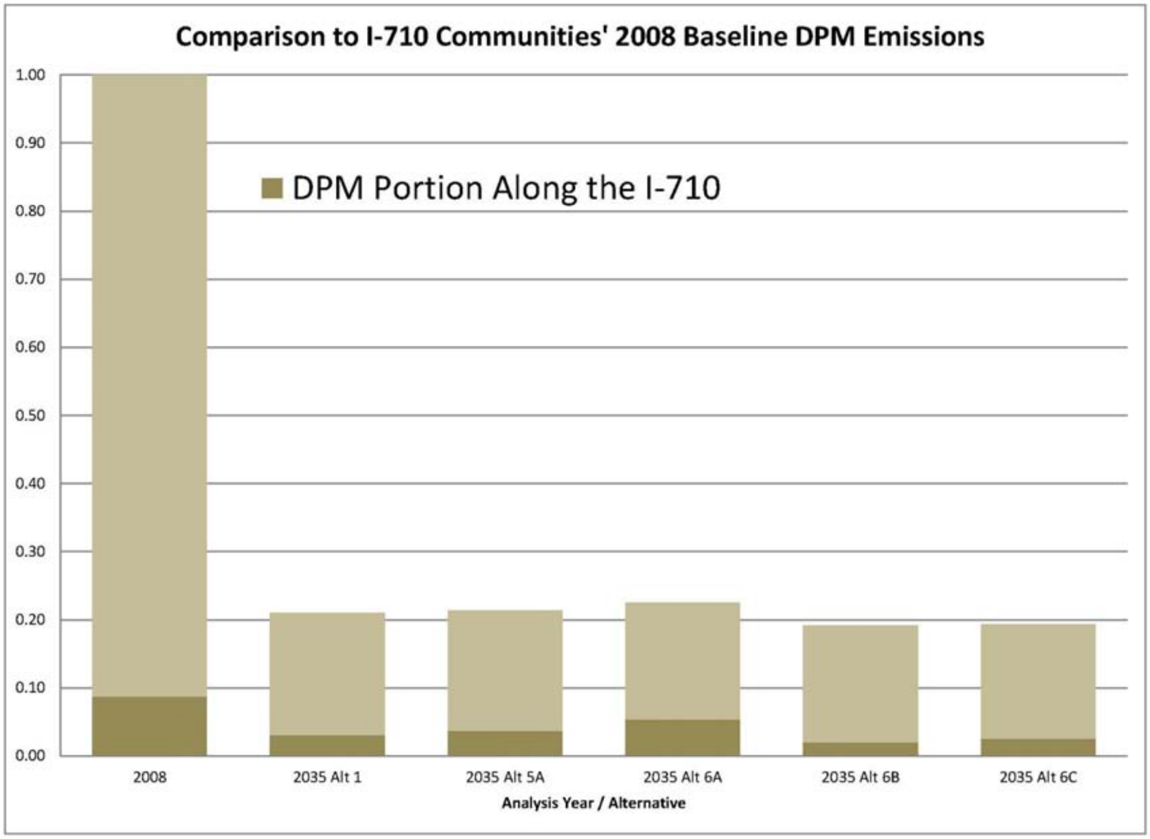

Figure ES.4 2035 Alternatives DPM emissions (as a fraction of the 2008 Area of Interest emissions)[10]

ES.5.2 Criteria Pollutant Incremental Emissions Impacts Compared to the 2008 Baseline

Emission tables for the incremental emission impact of all of the criteria pollutants (for the SCAB, Area of Interest, and the I-710 freeway itself) are included in Section 4.3.3 for all 2035 Alternatives compared to 2008 Baseline emissions. As with the MSAT, these emissions were calculated using the I-710 Traffic Model data. Where applicable, the SCAQMD CEQA regional mass emission significance thresholds are included for information purposes. All criteria pollutants (except total PM_{10} and SO_2) show decreases for the 2035 Alternatives compared to the 2008 Baseline, despite increases in vehicle miles travelled (VMT). This reduction in exhaust emissions is a result of the improvement in vehicle technology because of stricter adopted regulations or programs such as the San Pedro Bay Ports' Clean Air Action Plan, which will continue to reduce motor vehicle tailpipe emissions per mile of travel as newer, cleaner vehicles enter the fleet. The increase in total PM_{10} emissions results from the increase in entrained PM_{10} dust emissions; but exhaust PM_{10} emissions decrease in the SCAB in 2035. Entrained PM (both PM_{10} and $PM_{2.5}$) emissions in this project were calculated using the most recent (February 2011) EPA AP-42 equation. That equation assumes that roads have infinite amounts of dust (also known as silt reservoirs) to entrain. This is in contrast with the SCAQMD's

[10] Each bar represents the ratio of DPM within the AOI for future alternatives to the 2008 AOI DPM emissions. The bottom darker portion of each bar represents the DPM portion along the I-710 compared to the 2008 AOI DPM.

2007 Air Quality Management Plan (AQMP), which reflects the SCAQMD's judgment that the dust on freeways and major arterial roads is finite and an increase in vehicles (or VMT) will NOT result in additional entrained PM_{10} or $PM_{2.5}$ emissions.[11] After the I-710 Corridor Project emission calculations were completed, SCAQMD has proposed a modified methodology for entrained PM emissions as part of their 2012 AQMP development. In SCAQMD's proposed methodology, 2008 PM_{10} and $PM_{2.5}$ estimates will be lower, particularly $PM_{2.5}$ estimates. Most importantly, future year entrained PM will remain constant unless the roadway is lengthened. In this case, actual PM impacts for the project alternatives (compared to the 2008 baseline) would be more similar to the exhaust PM impacts than the results presented for total PM impacts. The exhaust PM_{10} emissions do decrease for the 2035 year alternatives when compared to the 2008 baseline, similar to the results of the other criteria pollutants.

Table ES.2 summarizes the incremental impacts of the criteria pollutants for the 2035 Alternatives compared to the 2008 baseline emissions for the SCAB. The SCAQMD's CEQA Significance Thresholds are also provided for reference.

Table ES.2 Incremental (2035 Alternatives minus 2008 Baseline) Traffic Emission Impacts – South Coast Air Basin

		Oxides of Nitrogen (NO_x)	Carbon Monoxide (CO)	PM_{10}	$PM_{2.5}$	Volatile Organic Compounds	Sulfur Dioxide (SO_2)
SCAQMD Thresholds* (lbs/day)		55	550	150	55	55	150
2035 South Coast Air Basin incremental emission impacts (traffic operations)	**No Build**	↓,<	↓,<	> (↓)	↓,<	↓,<	>
	Alt. 5A	↓,<	↓,<	> (↓)	↓,<	↓,<	>
	Alt. 6A	↓,<	↓,<	> (↓)	↓,<	↓,<	>
	Alt. 6B	↓,<	↓,<	> (↓)	↓,<	↓,<	>
	Alt. 6C	↓,<	↓,<	> (↓)	↓,<	↓,<	>

*** Please note that Caltrans will make the determination of significance. The SCAQMD thresholds presented for information purposes only.**

Notes:
↓ Decrease relative to the 2008 baseline year
< Less than SCAQMD significance threshold
> Greater than SCAQMD significance threshold
( ) Exhaust PM only

Incremental PM_{10} emissions (compared to the 2008 baseline for SCAB) increases are greater than the SCAQMD's threshold. However, these increases would NOT occur if it is assumed that the dust that can be entrained on freeways and major arterials is finite, as in the SCAQMD's 2007 AQMP. If the entrained dust from freeways and major arterial roadways would not increase with greater traffic levels (as seen in all 2035 alternatives), then the incremental PM_{10} emission impacts would be only the exhaust PM emissions (which includes brake and tire wear emissions, as well as tailpipe emissions) for these roadways. Exhaust PM_{10} and $PM_{2.5}$ emissions decrease in the SCAB for all 2035 alternatives.

[11] SCAQMD. 2007 AQMP (Appendix V, pages V-2-22 and V-2-23).

Incremental sulfur dioxide (SO_2) emissions (compared to the 2008 baseline for the SCAB) increase. This increase (~1300 lbs/day or 0.65 tons/day) is essentially the same for all 2035 alternatives and results from forecasted increases in VMT; the 2008 baseline already reflects the requirement for trucks to use ultralow sulfur diesel fuels in California that was adopted before 2008.

Incremental emission impacts for the AOI and on the I-710 freeway itself (including the proposed freight corridor, if applicable) were also calculated. [NOTE: Any comparison to SCAQMD thresholds is applicable for the entire SCAB only, not subareas of the region. SCAQMD established mass daily emissions thresholds (for itself as the lead agency and as guidance for other local lead agencies) that indicate when a project may have significant regional effects on air quality. SCAQMD used the SCAB as the setting for establishing these thresholds. Thus, the SCAQMD CEQA thresholds are presented with the incremental emissions (project alternative less the 2008) for the whole SCAB region only.] Table ES.3 summarizes the incremental impacts of the criteria pollutants for the 2035 Alternatives compared to the 2008 baseline emissions for the AOI and for the I-710 freeway itself (mainline and, as appropriate, the freight corridor).

Table ES.3 Incremental (2035 Alternatives minus 2008 Baseline) Traffic Emission Impacts – Area of Interest and on the I-710 Freeway Itself

		NO_x	CO	PM_{10}	$PM_{2.5}$	VOCs	SO_2
Area of Interest (including I-710 Communities)	No Build	↓	↓	↑(↓)	↓	↓	↑
	Alt. 5A	↓	↓	↑(↓)	↓	↓	↑
	Alt. 6A	↓	↓	↑(↓)	↓	↓	↑
	Alt. 6B	↓	↓	↑(↓)	↓	↓	↑
	Alt. 6C	↓	↓	↑(↓)	↓	↓	↑
I-710 freeway itself (traffic emissions on the I-710 mainline and, if applicable, freight corridor)	No Build	↓	↓	↑(↓)	↓	↓	↑
	Alt. 5A	↓	↓	↑(↓)	~(↓)	↓	↑
	Alt. 6A	↓	↓	↑(~)	↑(↓)	↓	↑
	Alt. 6B	↓	↓	↑(↓)	~(↓)	↓	↑
	Alt. 6C	↓	↓	↑(↓)	~(↓)	↓	↑

NOTES:
↓ Decrease relative to the 2008 baseline year
↑ Increase relative to the 2008 baseline year
~ No appreciable change relative to the 2008 baseline year
( ) Exhaust PM only

Incremental PM_{10} emissions (2035 alternatives compared to the 2008 baseline) increase for the Area of Interest and for the I-710 freeway itself (including the proposed freight corridor, if applicable). Incremental $PM_{2.5}$ emissions decrease for all 2035 Alternatives in the Area of Interest, as exhaust $PM_{2.5}$ reductions exceed increases (assuming an infinite silt reservoir) in entrained $PM_{2.5}$ due to VMT increases between 2008 and 2035. For the I-710 freeway itself, incremental $PM_{2.5}$ emissions decrease for the 2035 No-Build Alternative (Alternative 1) compared to the 2008 baseline; these incremental emissions increase for Alternative 6A and are essentially stay the same as 2008 emissions for 2035 Alternatives 5A, 6B and 6C. As noted above, this analysis assumes that the dust on the freeways and major arterial roadways is infinite, contrary to the assumptions in the 2007 AQMP. If the dust reservoir on freeways and major roadways is finite, the incremental emission impacts would be only the exhaust PM emissions (which includes brake and tire wear emissions, as well as tailpipe emissions) on these roadways. Exhaust PM_{10} and $PM_{2.5}$ emissions decrease/remain unchanged in the Area of Interest and the I-710 freeway itself for all 2035 alternatives as compared to 2008.

As for the SCAB, incremental sulfur dioxide emissions (compared to the 2008 baseline) increase in the Area of Interest and the I-710 freeway itself. The increases are similar for all 2035 alternatives and result from increases in VMT only since the 2008 baseline already reflects the ultralow sulfur diesel fuels required since the mid-2000s.

As an example comparison of exhaust emissions, Figure ES.5 shows the NOx emissions for the 2035 Alternatives compared to the 2008 NOx emissions (as a fraction of the 2008 NOx Area of Interest emissions).

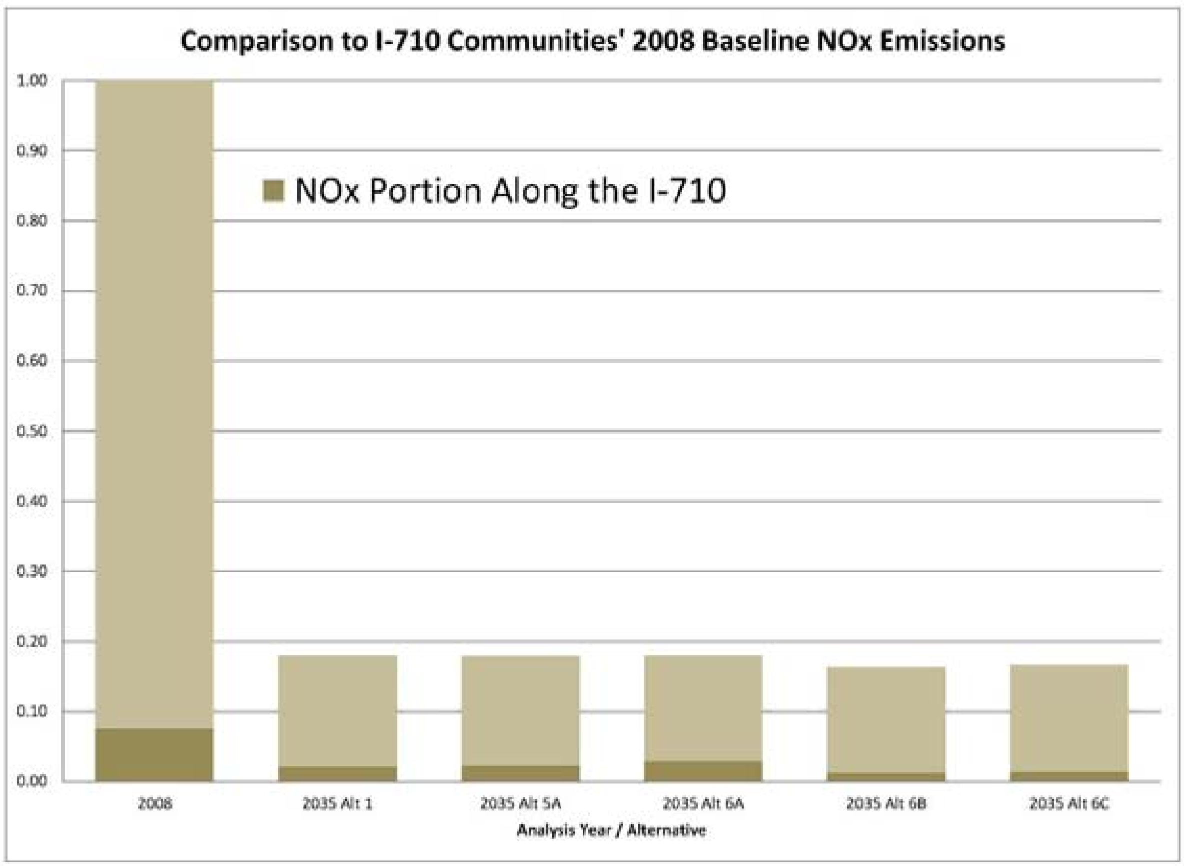

Figure ES.5 2035 Alternatives NO_x emissions (normalized to the 2008 Area of Interest emissions)[12]

[12] Each bar represents the ratio of NO_X within the AOI for future alternatives to the 2008 AOI NOx emissions. The bottom darker portion of each bar represents the NO_X portion along the I-710 compared to the 2008 AOI NO_X.

Overall 2035 NO_x emissions in the AOI are expected to be more than 80% lower than in 2008, with small variations among the alternatives. Overall NO_x emissions for the entire I-710 freeway itself are also lower in the 2035 alternatives (60% to 83% lower), although the variations are greater (60% lower in Alternative 6A and more than 80% lower in Alternatives 6B and 6C).

ES.5.3 Incremental Emissions Impacts of the 2035 Build Alternatives Compared to the 2035 No-Build Alternative (Alternative 1)

Comparisons of incremental criteria and air toxic emissions impacts for the 2035 Build Alternatives related to the 2035 No-Build Alternative (Alternative 1) are presented in the main report (Sections 4.3.1 and 4.3.5.1). For the 2035 Build Alternatives, emissions are greater on the I-710 freeway in various locations, certain roadways on the north and south ends of the I-710 for Alternatives 6A, 6B, and 6C (freight corridor alternatives) than in the 2035 No-Build (Alternative 1). Emissions are lower for some nearby freeways (including portions of SR-91, I-105 and I-605) and along much of the I-710 for Alternative 6B and 6C (zero emission freight corridor alternatives).

ES.6 I-710 Freeway Near-Roadway Health Risk and Air Quality Impacts

The previous section dealt with incremental emission impacts of the I-710 Corridor Project 2035 Alternatives. The 2035 criteria pollutant emissions impacts compared to 2008 baseline decreased in SCAB, AOI and the I-710 freeway for most pollutants (except for increases in total PM_{10} and SO_2 along the I-710 freeway). In addition, analysis of gridded incremental emission maps (see Section 4) show that some geographic areas near the I-710 freeway can have different incremental impacts because: 1) the proposed alignment changes for some segments of the alternatives from the current freeway alignment; 2) the inclusion of the freight corridor in 2035 Alternatives 6A, 6B, and 6C; 3) the effect of the zero emission freight corridor in 2035 Alternatives 6B and 6C; as well as 4) the changes in traffic volumes and patterns associated with each of the alternatives.

The SCAB is currently classified as a nonattainment area (standard is violated somewhere in the SCAB or Los Angeles County) for federal and state ozone, PM_{10}, $PM_{2.5}$, and lead standards; attainment with a maintenance SIP (attainment-maintenance) for federal CO and NO_2 standards; and attainment or attainment/unclassified for federal SO_2 and all other state standards. Table 2.1 in the main report provides more details on the attainment/nonattainment status for various pollutants.

Emissions released from sources (such as vehicles on roadways) are mixed and diluted in ambient air and transported away from the sources. Caltrans normally does not do air dispersion modeling for roadway projects, although specialized roadway dispersion modeling for impacts very close to the freeway (<500 feet) is done for certain projects. Various stakeholders believed that project alternative impacts from the I-710 freeway traffic would extend further into the local communities, based on the high level of truck traffic on the freeway. In response to public and community requests, Caltrans (the Lead Agency) had already committed to conducting full dispersion modeling to calculate the incremental air quality and health risk impacts of the I-710 Corridor Project Alternatives from emissions on the I-710 freeway (including the proposed freight corridor, as applicable). This is the first time that Caltrans had included this type of dispersion modeling for a freeway project, based on the unique nature of the I-710

Corridor Project. Full air dispersion modeling simulates the release and transport of emissions from sources in order to estimate the concentrations of the criteria pollutants at specified locations (called "modeling grid points") for greater distances away from the source(s). A dispersion model is a mathematical model that calculates impacts from emission sources at the modeling grid points. The main report and associated technical appendices discuss the air dispersion modeling steps used for calculating the concentrations of criteria pollutants. The emissions impact analysis confirmed that the greatest incremental impacts would occur along the I-710 freeway.

As mentioned above, specialized models are used to calculate air quality and health risks from roadways. These models, such as CALINE4 and CAL3QHC, calculate impacts up to 500 feet from the roadway, generally for modeling done to meet conformity requirements. Incremental air quality impacts from emissions generated by traffic on the I-710 freeway, which is the heaviest travelled goods movement freeway in the US, were anticipated to travel much farther distances. The Ports of Long Beach and Los Angeles use the EPA-approved AERMOD dispersion model in their terminal expansion projects, as well as in their Baywide HRA Tool used to establish the Baywide Health Risk Standards. (AERMOD is also a SCAQMD-approved model for stationary source permitting analyses.)

AERMOD was used in the I-710 Corridor Project Alternatives analysis of incremental near-roadway air quality and health risk impacts from emissions from the I-710 freeway itself (including proposed freight corridor emissions, if applicable.) Vehicle traffic was simulated as a series of volume emission sources along the I-710 freeway (and proposed freight corridor, if applicable). The I-710 freeway near-roadway AERMOD modeling uses over 4,000 such volume sources spaced approximately 50 m apart. Air Quality and health risk impacts were calculated at over 6,600 model grid points[13] and 1173 "sensitive" receptors[14] (e.g., schools, senior centers, daycare centers, etc.) were specifically analyzed.

IMPORTANT NOTE: Modeling of the quantities and effects of project traffic-related air pollution was performed using emissions data calculated only for the I-710 mainline and for certain alternatives, the freight corridor, using post-processed traffic data as described above. This was done because of several reasons, including 1) I-710 Traffic Model link data does not have information on all local roads (it is aggregated for certain origins and destinations) appropriate for near-roadway modeling, 2) post-processed data would not be available for other roadways, and 3) it was anticipated that the greatest impacts would be on the I-710 freeway and freight corridor because the project would result in higher traffic levels/emissions on the I-710. The modeling results do not reflect changes in emissions on the other nearby freeways, local arterials and other local roadways. Based on the emissions analysis of the build alternatives, emissions of criteria pollutants generally decrease on these nearby freeways, arterials and roadways as traffic shifts to the I-710. ***The modeling results presented account for the impacts from increased traffic on the I-710 for the build alternatives but do not account***

[13] Modeling grid points are100 meters by 100 meters to 500 meters from I-710, 250 meters by 250 meters from 500 to 2500 meters from I-710, and 500 meters by 500 meters from 2500 to 5000 meters from I-710

[14] 719 sensitive receptors were including as modeling points and additional 454 sensitive receptors were analyzed by interpolating the modeling results to those sensitive receptor locations. This was done because additional sensitive receptors were identified after the initial modeling runs in early 2010.

for any decreases in ambient concentrations related to reduced traffic on nearby freeways, arterials, and roadways for the build alternatives as mobility improves on the I-710. In addition, the modeling assumes weekday traffic levels/patterns for every day of the year, including weekends and holidays. All incremental cancer risk calculations are based on residential cancer risk assumptions, including 70-year ambient outdoor exposure (24/7/365). (Worker cancer risk is generally lower, since it assumes only work shift exposure for 40 years.) These assumptions are conservative and will generally yield a conservative estimate of incremental air quality and health impacts. These results should ONLY be used to compare the relative impacts of the alternatives.

ES.6.1 I-710 Freeway Near-Roadway Health Risk Assessment for Air Toxics (Comparison to 2008 Baseline)

The health risk assessment (HRA) for the Project was conducted using a methodology that is consistent with Office of Environmental Health Hazard Assessment (OEHHA)[15] Air Toxics Hot Spots Program Risk Assessment Guidelines and SCAQMD Rule 1401/212 risk assessment guidance.[16] The main report presents the methodology used for calculating the ambient air concentrations of the various MSAT. The most recent toxicity values (cancer potency slope factor, chronic reference exposure level and acute reference exposure level) as published by OEHHA were used in the HRA. The HRA was a multi-pathway risk assessment, which means that all the applicable pathways for a particular MSAT were evaluated when calculating the health risks. Calculated health metrics are incremental cancer risk (in number per million), incremental hazard index (chronic and acute; unitless), and cancer burden. Cancer burden was not calculated as the 2035 alternatives showed a decrease in cancer risk for all residential and commercial receptors; thus, the cancer burden would be a negative number.

Table ES.4 presents a summary of the incremental impacts for the 2035 Alternatives as compared to the 2008 baseline, as they relate to the SCAQMD's CEQA Significance Threshold for health risk metrics.

[15] Office of Environmental Health Hazard Assessment, *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*, August 2003.
[16] South Coast Air Quality Management District, Risk Assessment Procedures for Rules 1401 and 212. Version 7.0. July 2005.

Table ES.4 2035 Alternatives Incremental Emission Impacts (compared to the 2008 baseline)

		Health Risk Metrics and Averaging Periods		
		Maximum Incremental Cancer Risk	**Chronic Non-Cancer Health Index**	**Acute Non-Cancer Health Index**
		Annualized	Annual	1 hr
SCAQMD Thresholds*		> 10 in a million	Hazard Index (Chronic) ≥ 1	Hazard Index (Acute) ≥ 1
I-710 Roadway Dispersion Modeling	**No Build**	<	<	<
	Alt. 5A	<	<	<
	Alt. 6A	> (15 non-residential grid points only)	<	<
	Alt. 6B	<	<	<
	Alt. 6C	<	<	<

*** Please note that Caltrans will make the determination of significance. SCAQMD thresholds presented for information purposes only.**
NOTES:
< Less than SCAQMD significance threshold
> Greater than SCAQMD significance threshold

The 2035 alternatives show a decrease in cancer risk, chronic hazard index and acute hazard index as compared to the 2008 baseline, which is consistent with the MSAT mass emissions for the 2035 Alternatives being lower than those of the 2008 baseline. (Only 15 modeling grid points in Alternative 6A showed an increase in cancer risk. These modeling points do not lie in residential areas and are located in the vicinity of the freight corridor or near the railroad yards at the north end of the I-710 freeway.) The incremental cancer risk, chronic hazard index, and acute hazard index for all 2035 Alternatives, including Alternative 6A, as compared to the 2008 baseline were found to decrease at all the sensitive receptors (e.g., schools, senior centers, daycare centers, etc.) located within 5 km of the I-710 freeway centerline.

All 2035 build alternative show an increase in incremental cancer risk compared to the No-Build Alternative (Alternative 1) north of the Hobert rail yard. South of those rail yards incremental cancer risk is greater than the No-Build Alternative for Alternative 5A and 6A (within ~1 mile of freeway) and lower than the No-Build Alternative for Alternatives 6B and 6C.

ES.6.2 I-710 Freeway Near-Roadway Air Quality Impact (Comparison to 2008 Baseline)

As guidance to lead agencies, the SCAQMD has established CEQA significance thresholds for concentration impacts for NO_2 (1-hr and annual average), CO (1-hr and 8-hr), PM_{10} (24-hr and annual average), and $PM_{2.5}$ (24-hr average). Therefore, the concentration impacts for only these criteria pollutants and corresponding averaging periods were calculated and reported.

The SCAQMD's CEQA guidance assumes that the SCAB is in attainment for both the California and National Ambient Air Quality Standards (AAQS) for NO_2 and CO, meaning that the incremental impacts need to be added to the background ambient air concentration to be compared to the SCAQMD CEQA thresholds. (Note that the SCAB is now a California AAQS non-attainment area for NO_2 because of recent exceedences of the standard level at SCAQMD monitoring locations, including at the Lynwood/Compton Station used in our analyses). A single background monitoring station cannot be used as a representative station for all the receptors in the modeling domain because the project area is 18 miles long. Therefore, ENVIRON identified three different SCAQMD ambient air monitoring stations closer to the I-710 freeway that were used to derive the background concentrations.[17] SCAQMD's CEQA guidance calls for a comparison of the incremental PM_{10} and $PM_{2.5}$ concentrations to their CEQA thresholds.

Table ES.5 summarizes the results of the I-710 freeway near-roadway modeling air quality analysis comparison with the SCAQMD's thresholds. Incremental air quality impacts are for the 2035 Alternatives compared to the 2008 Baseline.

Table ES.5 2035 Alternatives Incremental Air Quality Impacts (compared to the 2008 baseline)

		Pollutants and Averaging Periods						
		NO_2		CO		PM_{10}		$PM_{2.5}$
		1 hr	Annual	1 hr	8 hr	24 hr	Annual	24 hr
SCAQMD Thresholds* ($\mu g/m^3$)		339	56	23,000	1,000	$\Delta_{2.5}$	$\Delta 1$	$\Delta_{2.5}$
I-710 Roadway Modeling	**No Build**	<	<	<	<	> (↓)	> (↓)	<
	Alt. 5A	<	<	<	<	> (↓)	> (↓)	> (↓)
	Alt. 6A	<	> (1 grid point)	<	<	>	>	>
	Alt. 6B	<	<	<	<	> (↓)	> (↓)	> (↓)
	Alt. 6C	<	<	<	<	> (↓)	> (↓)	> (↓)

*** Please note that Caltrans will make the determination of significance. SCAQMD thresholds presented for information purposes only.**

Notes:

< Less than SCAQMD significance threshold

> Greater than SCAQMD significance threshold

(↓) Decrease relative to the 2008 baseline year for exhaust PM emissions (grid points ≥50m from I-710 freeway)

All emitted NO_x assumed to be NO_2; this is a conservative assumption

All modeling grid points have levels below the new 1-hour NO_2 standard (188 $\mu g/m^3$)

The CO and NO_2 incremental impacts decrease for all 2035 alternatives as compared to the 2008 baseline (except for Alternative 6A at a single modeling grid point). The 2035 ambient concentration levels for NO_2, calculated by adding the incremental impacts to existing background concentrations were found to be below the California Ambient Air Quality Standards (CAAQS) and the National Ambient Air Quality Standards (NAAQS) except for one receptor, which is ~10 meter from the center of the freight corridor. This receptor is located in a non-residential area in meteorological zone 3 between the freight corridor and the LA River, in an area that is neither residential nor commercial. Most importantly, the annual average

[17] It should be noted that, for the air dispersion modeling, the project study area has been divided into four meteorological zones (see Section 4.3.4 for more details). One representative background ambient air monitoring station was used for receptors lying in a particular meteorological zone. It should further be noted that SCAQMD does not has a ambient air monitoring station in zone 1 and hence the data from the ambient air monitoring station for zone 2 was used for receptors lying in zone 1. The ambient air monitoring stations and related data are discussed in more detail in Sections 3.2 and 4.3.4.

background concentration at the nearest monitoring station is 57.6μg/m^3, which is greater than the CAAQS (56μg/m^3). Lastly, the analysis assumes that all NO_x is converted to NO_2.

On January 22, 2010, EPA promulgated a new 1-hour NO_2 standard. Unlike most criteria pollutant standards, this standard specifically focused on near-roadway exposure as well as regional exposure. EPA included this near-roadway standard after their review of the latest health effects studies linking higher short-term NO_2 levels near roadways with adverse health impacts. EPA is also requiring near-roadway (<50 meters) monitoring for urban areas with high populations and heavily trafficked roads, such as Los Angeles County, by no later than January 2013. SCAQMD staff gave a presentation[18] on the preliminary results of their 2009 I-710 near-roadway monitoring study to the I-710 Corridor Project Corridor Advisory Committee (CAC) in February 2010. ENVIRON calculated the incremental 1-hour NO_2 concentration changes for the 2035 alternatives compared to the 2008 base year levels. Calculated maximum 1-hour NO_2 concentration levels (maximum of the sum of the current background plus modeled incremental concentration change) are well below the new 1-hour NO_2 standard level of 100 ppb (or 188μg/m^3) as reductions in vehicle emissions from adopted regulations and fleet turnover reduce emissions faster than the rate of increase in vehicle miles travelled. The large reductions in NO_2 concentrations in the 2035 alternatives are consistent with EPA[19] and SCAQMD projections of reductions in future NO_2 levels.

All the build alternatives show an incremental increase in the PM_{10} and $PM_{2.5}$ concentrations as compared to 2008 baseline that are greater than the SCAQMD incremental thresholds. It should however be noted that these impacts are for total PM_{10} and $PM_{2.5}$, which also include the entrained dust emissions. As noted previously, ENVIRON used the new EPA's AP-42 methodology to estimate the entrained dust emissions; that method assumes an infinite silt on the roadway. The SCAQMD, in the 2007 AQMP, assumed a finite silt reservoir and did not increase the entrained emissions on freeways and arterial roadways from their baseline (assuming that the finite amount of dust would already be entrained by the original level of vehicle traffic). Impacts for only the exhaust portion of PM_{10} and $PM_{2.5}$ are below the SCAQMD incremental threshold at most model grid points. The model grid points that do show an exhaust PM impact greater than the SCAQMD significance threshold are almost all located in non-residential areas in close proximity to the I-710 freeway (or emission source).

ES.6.3 Incremental Health Risk and Air Quality Impacts of the 2035 Build Alternatives Compared to the 2035 No-Build Alternative (Alternative 1)

Comparisons of incremental air quality and health risk impacts for the 2035 Build Alternatives related to the 2035 No-Build Alternative (Alternative 1) are also presented in the main report (Sections 4.3.3 and 4.3.6). For health risk, model grid points close to the I-710 (mainline and/or freight corridor) show an increase in maximum incremental cancer risk, chronic hazard index and acute hazard index in some locations for all build alternatives when compared to the No Build Alternative (Alternative 1). This is a result of two factors 1) significant decrease in total

[18] SCAQMD. Presentation to the I-710 Corridor Project Community Advisory Committee (CAC). February 18, 2010. Presentation can be found at: www.metro.net/projects_studies/I710/images/AQMD-I-710-Air-Monitoring-Study-to-CAC-February-2010.pdf

[19] EPA. Final Regulatory Impact Analysis (RIA) for the NO_2 National Ambient Air Quality Standards (NAAQS). January 2010. See www.epa.gov/ttn/ecas/regdata/RIAs/FinalNO2RIAfulldocument.pdf

emissions in 2035 as compared to 2008 due to improved vehicle technology that lowers the No Build Alternative emissions for this comparison and 2) increases in DPM emissions in some locations for the build alternatives due to shifting freeway/freight corridor locations and increased mobility and capacity on the I-710 freeway as compared to the No Build Alternative. Section 4.3.6 provides a detailed explanation of these effects along with supporting figures and tables.

For incremental air quality impacts, all the Build Alternatives show an increase in impacts at some locations compared to the 2035 No-Build Alternative (Alternative 1). This occurs because of shifting freeway/freight corridor locations and increased mobility / capacity on portions of the I-710 freeway as compared to the No Build Alternative. Alternative 6B/6C shows the minimum increase in impacts amongst the build alternatives because the freight corridor is a zero emissions facility. These results are discussed in further detail in Section 4.3.4 of the main report.

ES.7 Construction Emissions (Criteria Pollutants)

The emissions of criteria pollutants from construction activities (vehicle/equipment exhaust and fugitive dust) were calculated using the Road Construction Emissions Model, Version 6.3.2, developed by Sacramento Metropolitan Air Quality Management District and modified for the SCAQMD area. Emission factors for vehicle exhaust (for both off-road and on-road vehicles/equipment) approved by the SCAQMD for Southern California were used to quantify the exhaust emissions. The construction of the project was analyzed for seven segments (created for preliminary engineering of the project) along the18-mile length of the Project. However, to have a conservative estimate of peak-day emissions, construction emissions were calculated for a “worst-case” scenario that assumed, among other things, that construction would occur simultaneously along the entire length of the corridor in the shortest possible time period. For additional details and explanation, please refer to Section 4.2 and Appendix B.

Table ES.6 summarizes the comparison of worst-case peak day emissions on any segment with the SCAQMD’s thresholds. All criteria pollutant single-segment peak-day emissions are below the SCAQMD threshold except NOx. The single-segment peak-day emissions may be spread out along the entire length of that segment (1.4 to 4.7 miles). Construction phasing could reduce the peak-day emissions. Simultaneous construction along the entire I-710 corridor is improbable but is analyzed in Section 4.2.

Table ES.6 Maximum Single-Segment Peak Day Construction emissions (lbs/day)

Pollutant		NO_x	CO	PM_{10}	$PM_{2.5}$	VOCs
SCAQMD Thresholds (lbs/day)		100	550	150	55	75
Construction (worst-case, peak day)	Alt. 5A	>	<	<	<	<
	Alt. 6A	>	<	<	<	<
	Alt. 6B	>	<	<	<	<
	Alt. 6C	>	<	<	<	<

Notes:
* Caltrans will make the determination of significance. SCAQMD thresholds presented for information only.

ES.8 Greenhouse Gas Emissions

A combination of the methodologies provided in the California Climate Action Registry's General Reporting Protocol (CCAR GRP), version 3.1 (CCAR 2009) and fuel consumption/efficiency data obtained from EMFAC 2007 and OFFROAD 2007 models, was used to calculate the greenhouse gases (GHG) emissions associated with the project. It should be noted that the GHG emissions were quantified only for the Basin region given the global effect of GHG emissions and the limits of the applicable traffic modeling results.

The total GHG emissions from the project are presented in carbon dioxide equivalents (CO_2e). CO_2e is universal unit of measurement to indicate the global warming potential (GWP) of each of the six greenhouse gases, expressed in terms of the GWP of one unit of carbon dioxide. It is used to evaluate the impact of different greenhouse gases on a common basis. Emissions of each GHG were converted to CO_2e by multiplying the methane (CH_4) and N_2O emissions with the respective GWP. Unlike other pollutants with existing control programs, calculated emissions of GHGs increase in future years (approximately 22M tonnes CO_2e/year for all 2035 Alternatives), since current standards are not expected to reduce GHG emissions sufficiently to overcome the effect of large increases in VMT (and VMT-related emissions). We note that certain mobile source GHG-related emission standards, such as the Pavely Standard, have been adopted in the last year and are not incorporated in our analysis. Implementation of these new regulations would reduce the increase in GHG emissions for all 2035 Alternatives.

For the project build alternatives, Table ES.7 below summarizes the results of the traffic-related GHG emissions compared to 2035 Alternative 1 (the No Build Alternative). Note that Alternative 6B reduces GHG emissions by over a half million tons/year in 2035.

Table ES.7 Incremental GHG Emissions using The I-710 Traffic Model Data as Compared to No Build Alternative for SCAB (tons/year)

Greenhouse Gas	Alt. 5A - Alt. 1	Alt. 6A - Alt. 1	Alt. 6B - Alt. 1	Alt. 6C - Alt. 1
CH_4	0.016	0.028	0.026	0.028
N_2O	1.1	1.9	1.8	1.9
CO_2	300	-120,000	-600,000	-490,000
Total (CO_2e)	670	-120,000	-600,000	-490,000

ES.9 PM Mortality and Ultrafine Particulates (qualitative assessments)

The analysis of PM mortality and morbidity is a qualitative assessment based on comparative analysis of total $PM_{2.5}$ emissions for the various alternatives. In other words, for the purpose of this qualitative assessment, total $PM_{2.5}$ emissions and near-roadway concentrations (sum of exhaust and entrained dust emissions) are used as a surrogate for potential PM exposure. The total $PM_{2.5}$ emissions in the SCAB and Area of Interest were found to be lower than 2008 baseline emissions for all 2035 Alternatives except at a few locations on the I-710 freeway. I-710 near-roadway modeling concentrations increased above the SCAQMD threshold level for model grid points near the freeway for 2035 Freight Corridor Alternatives (Alts. 6A/6B/6C). Most of these grid points are within 100 meters of the freeway and/or freight corridor. Areas slightly farther away from the roadways in these locations would have increases below the SCAQMD's threshold level. Consequently, the public's exposure to PM-related morbidity and mortality health risks would generally decrease relative to the 2008 baseline; the exceptions would be some locations near portions of the I-710 freeway and/or freight corridor. Note that if the 2008 entrained road dust emissions from freeways do not increase or only slightly increase in the 2035 Alternatives (consistent with the 2007 AQMP), incremental $PM_{2.5}$ emissions (in this case, essentially the exhaust emissions) and related air quality impacts compared to the 2008 baseline would decrease or be below the SCAQMD threshold levels. For further detail and explanation, please refer to Section 4.5, PM Mortality and Morbidity.

ENVIRON conducted a qualitative analysis of incremental ultrafine particulate (or UFP) impacts by using exhaust $PM_{2.5}$ emissions as a surrogate for UFP exposure.[20] Exhaust I-710 $PM_{2.5}$ emissions for the 2035 Alternatives (Alternatives 1, 5A, 6A, 6B and 6C) were lower than 2008 baseline emissions for the SCAB, Area of Interest, and the I-710 freeway (except a very few locations on the I-710 freeway in Alternative 6A). I-710 freeway near-roadway concentration impacts (annual and maximum 24-hour average $PM_{2.5}$ concentrations) were lower for all 2035 Alternatives compared to 2008, with the exception of a few locations within 100 meters of the I-710 freeway in Alternative 6A. Consequently, the public's exposure to ultrafine particulates should decrease for all 2035 Alternatives relative to the 2008 baseline, with the greatest decreases further from the I-710 freeway and decreases at most locations near the I-710 freeway (and freight corridor, if applicable). Alternatives 6B and 6C had the lowest exhaust $PM_{2.5}$ emissions and modeled concentration impacts of all 2035 alternatives (even 2035 Alternative 1) and would therefore have the lowest project-related ultrafine exposures.

ES.10 Air Quality Conformity

ES.10.1 Project Level Air Quality Conformity

The SCAB, which is the location of the proposed I-710 project, is in nonattainment or attainment-maintenance for one or more Federal transportation-related air quality standards (See Section 4.1 for further details). Therefore a project-level transportation conformity review based on the process described in Federal Clean Air Act Section 176(c) and USEPA regulations at 40 CFR 93 applies.

CO Hot-Spot Analysis: The proposed I-710 Corridor Project is located within an attainment/maintenance area for CO. Based on this designation a project-level conformity analysis is required for CO. In general, the procedures outlined in the "Transportation Project-Level Carbon Monoxide Protocol" (commonly referred to as the "CO Protocol" were applied for the CO impact assessment. Through the interagency consultation process, the approach suggested in the CO Protocol was modified slightly to incorporate the use of the EPA-approved mobile source dispersion model CAL3QHC to model representative worst-case congested intersections throughout the project's Area of Interest (AOI).

[20] The rationale for this choice is that both UFP and exhaust $PM_{2.5}$ emissions are particulates and primarily the result of internal combustion processes. CO is sometimes used as a UFP surrogate. CO emissions decreased on the I-710 Freeway for all 2035 Alternatives.

Based on traffic study data, afternoon (PM) peak-hour data was considered the worst-case scenario and used as the basis for the intersection selection and "hot spot" modeling process. Because traffic conditions (delay) under Alternative 6B were generally worse compared to the other 'build' alternatives, modeling results associated with projected future conditions at 10 selected intersections under Alternative 6B were used to quantitatively assess the potential for traffic-related impacts of the project and its alternatives. Section 4.7 of the main report summarizes the results of this analysis and Appendix H presents the full analysis. Based on the modeling performed using EPA-approved methods, assumptions and tools and the traffic study data, the Project alternatives would not cause CO concentrations to exceed the CO standards or delay the timely attainment of the standards.

$PM_{2.5}$ and PM_{10} Hot-Spot Analysis: LSA prepared the PM_{10}/$PM_{2.5}$ Qualitative "Hot-Spot" Analyses. Transportation conformity is required under Section 176(c) of the CAA to ensure that federally supported highway and transit project activities are consistent with the purpose of the SIP. Conformity for the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant AAQS. As required by the 2006 Final Rule, this qualitative $PM_{2.5}$ and PM_{10} hot-spot analysis demonstrates that this project meets the CAA conformity requirements to support State and local air quality goals with respect to potential localized air quality impacts.

A qualitative hot spot analysis for particulate matter (PM_{10} and $PM_{2.5}$) was prepared using USEPA's 2006 guidance document. The SCAG Interagency Consultation process was used to determine the appropriate model (EMFAC 2007) and planning assumptions, and the hot spot analysis was reviewed by the Consultation group on January 25, 2011. The analysis shows that new or worsened localized PM_{10} or $PM_{2.5}$ violations due to project implementation are unlikely for the highest-emission year, represented by the opening year and the horizon year 2035. The horizon year encompasses the entire conformity analysis period of the current Regional Transportation Plan.

For reasons summarized in Section 4.8 and detailed in Appendix I, future new or worsened $PM_{2.5}$ and PM_{10} violations of any standards are not anticipated; therefore, the project meets the conformity hot-spot requirements in 40 CFR 93-116 and 93-123 for both $PM_{2.5}$ and PM_{10}.

ES.10.2 Regional Air Quality Conformity

The project is in the 2008 financially constrained Regional Transportation Plan (RTP), which was found to conform by the FHWA/ FTA on June 5, 2008 (Project ID: iC0401; Description: I-710 Corridor user-fee backed capacity enhancement – widen to 5 mixed flow + 2 dedicated lanes for clean technology trucks [each direction], and interchange improvements). The design concept and scope of the project are consistent with the project description in the 2008 RTP. The project is not currently in the SCAG financially constrained 2011 Federal Transportation Improvement Program (FTIP), which was found to be conforming by the FHWA/FTA on December 14, 2010. However, the project will be included in a future amendment to the 2011 Federal Transportation Improvement Program (FTIP) and it is anticipated that it will be found to be conforming by the FHWA/FTA in early 2012. Therefore, once the project listing is included in the conforming RTP and FTIP, the Build Alternatives will be in conformance with the State Implementation Plan (SIP).

ES.11 AQ/HRA Results Summary Overview

The AQ/HRA impacts of I-710 freeway project alternatives were assessed using multiple metrics. A single metric cannot, and should not, be used to evaluate the full AQ/HRA impacts of any project alternative. The results of the different analyses should be considered together to give a fuller and more comprehensive understanding of project AQ/HRA impacts. This section presents a summary overview.

The results of each of the emissions, air quality and health risk impact analyses from the project are summarized above in this Executive Summary. In general, emissions of criteria and air toxic pollutants (note exceptions discussed below) decreased in the 2035 alternatives compared to the 2008 baseline. Emission reductions for the Build alternatives were greatest in the South Coast Air Basin (SCAB) and Area of Interest (including cities and communities along the I-710 Corridor) as increased capacity on the I-710 freeway itself shifts traffic to the I-710 from nearby freeways and local roadways. Even along the I-710, emissions of criteria and air toxic pollutants decreased in the 2035 Build alternatives compared to the 2008 baseline, as federal, state and local air quality regulations, programs, and standards reduced emissions faster than emission increases due to increases in vehicle miles travelled (VMT) in 2035. The exceptions were total PM_{10} and SO_2 emissions. The increased entrained road dust may be an artifact of the EPA-42 assumption of an infinite silt reservoir on the freeway; if it is an artifact, it should be noted that exhaust PM_{10} decreases in the SCAB, AOI and along the I-710 freeway. Incremental SO_2 increases in 2035 are much, much less than reductions that will result from recently adopted rules and regulations in major sources of SO_2 such as ocean going vessels and RECLAIM SO_x sources.

The Build alternatives increase capacity on the I-710 freeway itself; although this reduces traffic (and emissions) on local roadways and nearby freeways, it does increase traffic levels on the I-710 freeway itself, potentially increasing air quality and health risk impacts near the I-710. (Ambient concentrations of criteria and air toxic pollutants are a function of both the spatial and temporal distribution of emissions, as well as the distance to receptors and prevailing meteorology.) Full air quality dispersion modeling of the I-710 freeway itself (using the EPA-approved AERMOD model) assessed near-roadway impacts from the I-710 freeway, which is the source with greatest emissions and community concern. ambient criteria pollutant concentrations (except PM_{10} and $PM_{2.5}$), cancer risk, and non-cancer hazard indices (chronic and acute) decrease compared to the 2008 baseline , except for a small number of model grid points (mainly in non-residential locations) in Alternative 6A where the proposed freight corridor would be aligned appreciably to the east or west of the I-710 mainline. Total PM_{10} (and in some cases total $PM_{2.5}$) incremental concentration impacts are generally less than the SCAQMD's significance thresholds except for certain locations close to (<300 meters) the I-710 freeway. As noted above, the increase in entrained PM emissions on the I-710 freeway may be an artifact of the emission factor methodology used in this study and exhaust PM_{10} and $PM_{2.5}$ concentrations are typically lower than the 2008 baseline. PM mortality and exposure to ultrafine particulates in 2035 for all alternatives are also expected to be generally less than the 2008 baseline, based on the incremental changes in total and exhaust $PM_{2.5}$ respectively and assumptions about the relationships between $PM_{2.5}$ and mortality/ultrafines.

Alternatives 5A and 6A show areas of increased impacts compared to the No Build Alternative. This is generally the result of closer proximity to modeling grid points (due to the widening of the I-710 and/or presence of the new freight corridor), greater traffic levels, and in the case of diesel particulate matter (DPM), the increase in emissions resulting from improved traffic mobility (average speeds greater than about 20 to 25 mph). Compared to the No-Build Alternative, Alternative 6B shows generally lesser impacts than the other Build alternatives.

A detailed discussion of these topics is provided in Section 4, Environmental Consequences.

1 Introduction

Interstate 710 (I-710, also known as the Long Beach Freeway) is a major north-south interstate freeway connecting the City of Long Beach to central Los Angeles. Within the I-710 Corridor project study area, the freeway serves as the principal transportation connection for goods movement between the Ports of Los Angeles (POLA)/Long Beach (POLB), located at the southern terminus of the freeway, and the BNSF/UPRR railyards in the cities of Commerce and Vernon. The I-710 Major Corridor Study (MCS), undertaken to address the I-710 mobility and safety needs and to explore possible solutions for transportation improvements, was completed in March 2005 and identified a community-based Locally Preferred Strategy (LPS) consisting of ten general purpose lanes next to four separated freight movement lanes. The Los Angeles County Metropolitan Transportation Authority (Metro), the California Department of Transportation (Caltrans), the Gateway Cities Council of Governments (GCCOG), the Southern California Association of Governments (SCAG), POLA, POLB, and the I-5 Joint Powers Authority (JPA), are collectively known as the I-710 Corridor Project funding partners. These agencies are collectively funding the preparation of preliminary engineering and environmental documentation for the proposed I-710 Corridor Project to evaluate improvements along the I-710 Corridor from Ocean Boulevard in the City of Long Beach to State Route 60 (SR-60). The I-710 Funding Partners are committed to conducting this engineering and environmental study effort within the same broad, continuous community participation framework that was used for the MCS.

The environmental impacts of the proposed project will be assessed and disclosed in compliance with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Caltrans is the Lead Agency for CEQA, and is the lead federal agency for NEPA pursuant to Section 6005 of the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) (23 U.S.C. 327). Caltrans (the lead agency[21]) and Metro have initiated work on the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the proposed project, the purpose of which is to inform the public and governmental decision-makers of possible environmental effects associated with the proposed project alternatives and to describe the measures that would be undertaken to mitigate those effects.

In support of the EIR/EIS and transportation conformity determinations, ENVIRON conducted air quality and health risk assessments (AQ/HRA) to evaluate the incremental air quality and human health risk impacts associated with the proposed project and project alternatives as compared to the baselines (i.e., 2008 Notice of Preparation baseline for CEQA or 2035 No Federal Action baseline for NEPA). The AQ/HRA for this Project consists of two parts, meeting two separate regulatory requirements:

[21] Caltrans is the lead agency under CEQA. Under NEPA, the Federal Highway Administration's (FHWA's) responsibility for environmental review, consultation, and any other action required in accordance with applicable federal laws for this project is being carried out by Caltrans under its assumption of responsibility pursuant to 23 United States Code (USC) 327.

- An analysis of air quality and human health risk impacts for the EIR/EIS document, consistent with CEQA/NEPA requirements.
- “Hot-spot” analyses in support of the transportation conformity determination, consistent with federal and state transportation conformity requirements.

The various analyses and the methodologies used to carry out the analyses follow the April 2010 I-710 AQ/HRA Protocol[22] prepared by ENVIRON; the protocol was released in March 2009, with final revisions in April 2010). The Air Quality / Health Risk Assessments (AQ/HRA) Working Group, comprised of Funding Partner representatives, oversaw the development of the I-710 AQ/HRA Protocol. In addition, an Agency Air Technical Working Group (or AATWG), comprised of representatives from the U.S. Environmental Protection Agency (USEPA), California Air Resources Board (CARB), South Coast Air Quality Management District (SCAQMD), Federal Highways Administration (FHWA), Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA), U.S. Army Corps of Engineers, Los Angeles District, as well as Funding Partner representatives, was consulted during the preparation of the draft I-710 AQ/HRA Protocol. Briefings were made to the Environmental Subject Working Group, Corridor Advisory Committee, Technical Advisory Committee, and Project Committee. The draft I-710 AQ/HRA Protocol was released for comments in March 2009. Revisions to the I-710 AQ/HRA Protocol, based on comments received in April 2009 and information from initial analyses, are described in the April 2010 Draft Final AQ/HRA Protocol.

1.1 Project Purpose

The purpose of the proposed I-710 Corridor Project (Proposed Project) is to achieve the following within the I-710 corridor:

- Improve air quality and public health
- Improve traffic safety
- Address design deficiencies of the I-710 freeway
- Address projected traffic volumes
- Address projected growth in population, employment, and activities related to goods movement

1.2 Project Study Area

The general I-710 Corridor Project study area includes the portion of the I-710 from Ocean Boulevard in Long Beach to SR-60, a distance of approximately 18 miles. Specific study areas may be established for individual analyses. For example, the traffic study area for the project currently extends one mile east and west of the I-710 and includes freeway to freeway interchanges at I-405, SR-91, I-105, and I-5. Additionally, the traffic study examines intersections and roadway segments of key north/south and east/west arterials from Wilmington

[22] Protocol for the Air Quality and Health Risk Assessments (AQ/HRA) for the I-710 Corridor Environmental Impact Report/ Environmental Impact Statement (EIR/EIS); Prepared for URS Corporation; Prepared by ENVIRON International Corporation; April 26, 2010.

Avenue in the west to Lakewood Boulevard in the east.[23] Given the size of the I-710 Corridor Project and its impact on the region, incremental emission impacts were assessed for the South Coast Air Basin (or SCAB) and an Area of Interest (or AOI), which is a sub-region of the SCAB that includes cities and communities along the I-710 freeway. For the AQ/HRA, the AERMOD dispersion model and a coarse receptor grid was used to determine a zone of impact of the emissions from the I-710 freeway itself, which becomes the general AQ/HRA study area. The project study area is presented in Figure 1.1.

1.3 Project Baselines

The AQ/HRA performed for any projects under CEQA/NEPA are conducted for the changes (i.e., increments) in project-related emissions, air quality impacts, and health risks relative to a baseline condition. Therefore, identifying the baseline condition is an important step in the EIR/EIS process. Furthermore, it is important to note that the definition of baseline differs under CEQA and NEPA as discussed below:

- **The CEQA Baseline** represents existing, current conditions, defined to be the conditions at the time the Notice of Preparation (NOP) was released. Therefore, the CEQA baseline will represent project-specific conditions in the year 2008 (e.g., traffic conditions on the I-710 and selected roadways in the year 2008).
- **The NEPA Baseline** represents conditions in a future analysis year and where no federal funds were used for the project. In this case, the "No Build Alternative" in the year 2035 (also known as Alternative 1) will represent the NEPA baseline.

1.4 Project Alternatives

This section describes the alternatives that were developed by a multidisciplinary technical team to achieve the I-710 Corridor Project purposes. Various committees involved in the I-710 Corridor Project community participation framework reviewed the alternatives. The Alternative Screening process for this Project recommended that three 2035 build alternatives (Alternative 5A, 6A, 6B) be evaluated in the EIR/EIS along with Alternative 1, the 2035 No Build Alternative[24]. Subsequently in late 2010, the Funding Partners added a fourth build alternative (Alternative 6C). The alternatives are discussed in detail below (Figure ES.2 summarizes the build alternatives).

1.4.1 Alternative 1 – No Build Alternative

The No Build Alternative does not include any improvements within the I-710 Corridor other than those projects that are already planned and committed to be constructed by or before 2035. The projects included in this alternative are based on SCAG's 2008 Regional Transportation Improvement Program (RTIP) project list, including freeway, arterial, and transit improvements within the SCAG region. This alternative also assumes that goods movement to and from the ports make maximum utilization of existing railroad capacity within the I-710 corridor. Alternative

[23] Freeway Traffic Operations Analysis Report (Draft); Prepared for Los Angeles County Metropolitan Transportation Authority; Prepared by URS; December 2, 2009.
[24] Technical Memorandum – Alternatives Screening Analysis (Final); Prepared for Los Angeles County Metropolitan Transportation Authority; Prepared by URS; May 29, 2009.

1 is the baseline against which the Build Alternatives proposed for the I-710 Corridor will be assessed. The existing I-710 freeway generally consists of eight GP lanes north of I- 405 and 6 GP south of I-405 (four northbound and four southbound).

1.4.2 Alternative 5A – Freeway Widening up to 10 General Purpose (GP) Lanes

Alternative 5A proposes to widen I-710 up to 10 GP lanes (I-710 northbound and I-710 southbound). This alternative will eliminate design deficiencies at the I-405 and SR-91 interchanges, reconfigure some local arterial interchanges throughout the corridor, eliminate freeway access at three locations and shift the freeway centerline at various locations to reduce right-of-way impacts.

In addition to improvements on the freeway mainline and on the interchanges, Alternative 5A also includes Transportation Systems/Transportation Demand Management (TSM/TDM), Transit, and Intelligent Transportation Systems (ITS) improvements. TSM improvements include provision of ramp metering at 13 locations and improved signage will be added throughout the project area. Parking restrictions during peak periods will be implemented on four arterial roadways - Atlantic Boulevard between Pacific Coast Highway and SR-60; Cherry Avenue/Garfield Avenue between Pacific Coast Highway and SR-60; Eastern Avenue between Cherry Avenue and Atlantic Boulevard; and Long Beach Boulevard between San Antonio Drive and Firestone Boulevard. Transit improvements include increased service on all Metro Rapid routes and local bus routes in the study area. Additionally, expansion of existing community bus service will be provided (e.g., Montebello Transit, Compton Renaissance Transit System, and East Los Angeles Shuttle). Rail transit improvements include increased peak period service on the Blue and Green Lines and a station upgrade to the Commerce Metrolink station. Additionally, a new connection between the Green Line Norwalk station and the Metrolink Norwalk station will be provided expanding the existing Metrolink service. ITS improvements include updated fiber optic communications.

1.4.3 Alternative 6A – 10 GP Lanes plus a Four-Lane Freight Corridor

Alternative 6A includes all the components of Alternatives 1 and 5A as described above. In addition, this alternative includes a separated four-lane freight corridor to be used by conventional trucks. It should be noted that trucks using this freight corridor are expected to be newer (post-2007) projected diesel/fossil-fueled trucks (new or retrofitted engines required per new regulations and standards) that will generate fewer emissions than the trucks using I-710 today.

The freight corridor would be an at-grade and/or elevated structure, with two lanes in each direction, between Ocean Boulevard and the intermodal rail yards in the cities of Vernon and Commerce. There would be dedicated ingress and egress points at the following locations:

- Harbor Scenic Dr. (NB ingress only)
- Ocean Blvd. (NB ingress only)
- Pico Ave. to NB FC
- SB FC to Pico Ave.

- Anaheim St. to NB FC
- SB FC to Anaheim St.
- SB FC to SB I-710 just south of Pacific Coast Hwy
- NB I-710 GP lanes to NB FC (north of I-405 at 208th St.)
- SB FC to SB I-710 GP lanes (north of I-405 at 208th St.)
- NB FC to eastbound (EB) SR-91
- Westbound (WB) SR-91 to SB FC
- NB FC to Patata St.
- Patata St. to SB FC
- SB I-710 GP lanes to FC just south of Bandini Blvd.
- NB FC to I-710 GP lanes just south of Bandini Blvd.
- Washington Blvd. to SB FC
- NB FC to Washington Blvd

1.4.4 Alternative 6B– 10 GP Lanes plus a Zero Emissions Four-Lane Freight Corridor

Alternative 6B includes all the components of Alternative 6A as described above, but would restrict the use of the FC to zero-emission trucks rather than conventionally powered trucks. This proposed zero emission truck technology is assumed to be trucks powered by electric motors in lieu of internal combustion engines and producing zero tailpipe emissions while traveling on the freight corridor. The specific type of electric motor is not defined, but feasible options include linear induction motors or linear synchronous motors. The power systems for these electric propulsion trucks could include, but is not limited to, battery-power, trucks receiving electric power on the FC from electrical power systems embedded in the FC pavement, overhead catenary electrical lines providing power to trucks equipped with a pantograph (a device that collects electric current from overhead lines), or some combination of these systems (e.g., wayside power distribution while traveling along the FC and battery power elsewhere). For purposes of this analysis, the zero-emission electric trucks are assumed to receive electric power while traveling along the FC via an overhead catenary electric power distribution system.

Alternative 6B also includes the assumption that all trucks using the FC will have an automated control system that will steer, brake, and accelerate the trucks under computer control while traveling on the FC. This will safely allow for trucks to travel in “platoons” of 6–8 trucks and increase the capacity of the FC from a nominal 2,350 passenger car equivalents per lane per hour (pces/ln/hr) (as defined in Alternative 6A) to 3,000 pces/ln/hr in Alternative 6B.

The design of the FC will also allow for possible future conversion, or be initially constructed, as feasible (which may require additional environmental analysis and approval), of a fixed-track guideway family of alternative freight transport technologies (e.g., Maglev). However, these fixed-track family of technologies have (for now) been screened out of this analysis, as they have been determined to be inferior to electric trucks in terms of cost and ability to readily serve the multitude of freight origins and destinations served by trucks using the I-710 corridor.

1.4.5 Alternative 6C– 10 GP Lanes plus a Zero Emissions Four-Lane Freight Corridor Tolled

Alternative 6C includes all the components of Alternative 6A (including conventionally powered trucks) plus the automated truck element of Alternative 6B as described above, but would toll the trucks using the FC. Tolls would be collecting using electronic transponders (which would require overhead sign bridges and transponder readers like the SR-91 toll lanes currently operating in Orange County, where no cash toll lanes are provided. The toll pricing structure would provide for collection of higher tolls during peak travel periods of $10 ($0.625/mi) in a.m. (6:00 a.m.–9:00 a.m.) and p.m. (3:00 p.m.–7:00 p.m.) peak periods and $5 ($0.313/mi) in the midday and night periods for a truck trip traveling the entire length of the FC in either the NB or SB direction.

2 Regulatory Setting

2.1 Air Quality Standards

The Clean Air Act as amended in 1990 is the federal law that governs air quality. Its counterpart in California is the California Clean Air Act of 1988. These laws set standards for the quantity of pollutants that can be in the air. At the federal level, these standards are called National Ambient Air Quality Standards (NAAQS). Standards have been established for six criteria pollutants that have been linked to potential health concerns; the criteria pollutants are: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), lead (Pb), and sulfur dioxide (SO_2). The state of California has its own set of ambient air quality standards that is known as California Ambient Air Quality Standards (CAAQS).

Two types of ambient air quality standards have been established: primary (to protect the public health with an adequate margin of safety) and secondary (to protect the public welfare against adverse non-health-related environmental effects). Primary NAAQS/CAAQS are limits set to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly.[25,26] Table 2.1 below provides the NAAQS and the CAAQS and also provides the attainment status of South Coast Air Quality Management District (SCAQMD).

Table 2.1 Ambient Air Quality Standards

Pollutant	Averaging Period	California Standard Level[1]	Federal Standard Level[2]	SCAB Attainment Status	
				California Standard[3]	Federal Standard[4]
Ozone (O_3)	1 hour	0.09 ppm (177 $\mu g/m^3$)	Revoked	Non-Attainment	---
	8 hour	0.070 ppm (137 $\mu g/m^3$)	0.075 ppm (147 $\mu g/m^3$)	Non-Attainment	Extreme Non-Attainment
Respirable Particulate Matter (PM_{10})	24 hour	50 $\mu g/m^3$	150 $\mu g/m^3$	Non-Attainment	Serious Non-Attainment
	Annual	20 $\mu g/m^3$	Revoked	Non-Attainment	---
Fine Particulate Matter ($PM_{2.5}$)	24 hour	---	35 $\mu g/m^3$	---	Non-Attainment
	Annual	12 $\mu g/m^3$	15 $\mu g/m^3$	Non-Attainment	Non-Attainment
Carbon Monoxide (CO)	1 hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	Attainment	Attainment / Maintenance
	8 hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	Attainment	Attainment / Maintenance
Nitrogen Dioxide (NO_2)	1 hour	0.18 ppm (339 $\mu g/m^3$)	0.100 ppm (188 $\mu g/m^3$) [5]	Non-Attainment	N/A – See discussion below
	Annual	0.03 ppm (56 $\mu g/m^3$)	0.053 ppm (100 $\mu g/m^3$)	Non-Attainment	Attainment
Lead (Pb)	30 day average	1.5 $\mu g/m^3$	---	Non-Attainment[7]	---

25 http://www.epa.gov/air/criteria.html.
26 http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm

Table 2.1 Ambient Air Quality Standards

Pollutant	Averaging Period	California Standard Level[1]	Federal Standard Level[2]	SCAB Attainment Status	
				California Standard[3]	Federal Standard[4]
Lead (Pb)	Rolling 3 month average[6]	---	0.15 μg/m³	---	Non-Attainment
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm (655 μg/m³)	0.075 ppm (197 μg/m³)	Attainment	Attainment
	3 hour[8]	---	0.5 ppm (1310 μg/m³)	---	Attainment
	24 hour	0.04 ppm (105 μg/m³)	---	Attainment	---
Hydrogen Sulfide (H_2S)	1 hour	0.03 ppm (42 μg/m³)	---	Unclassified	---
Vinyl Chloride	24 hour	0.01 ppm (26 μg/m³)	---	N/A	---
Sulfates	24 hour	25 μg/m³	---	Attainment	---
Visibility-Reducing Particles	N/A	Extinction coefficient of 0.23 per kilometer (visibility of ten miles or more due to particles when relative humidity is less than 70%)	---	Unclassified	---

Notes:
--- means not applicable.
N/A means not available.
[1] California standards based on CARB website (http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm).
[2] Federal standards based on USEPA website (http://epa.gov/air/criteria.html). Note that some federal standards include a level (such as the concentrations shown in the Table) and a form (often a statistical form or based on excluding a certain number of exceedences of the standard level over a given number of years). Exceedences of the standard level are not necessarily violations or exceedences of the standard.
[3] California standard attainment status based on CARB website (www.arb.ca.gov/desig/adm/adm.htm).
[4] Federal standard attainment status based on USEPA and CARB websites (www.epa.gov/air/oaqps/greenbk/index.html and www.arb.ca.gov/desig/adm/adm.htm). Note that SCAQMD submitted an attainment redesignation request for PM_{10} in January 2010.
[5] New EPA standard effective January 22, 2010.
[6] Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m³ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
[7] Only LA County area within SCAB is in non-attainment.
[8] This is a secondary standard.

New federal 1-hour NO_2 standard: On January 22, 2010, EPA promulgated a new 1-hour NO_2 standard. The new standard was set at 100 ppb, expressed as the 3-year average of the 98th percentile of the annual distribution of daily maximum 1-hour average concentrations. Unlike most criteria pollutant standards, this standard specifically focused on near-roadway exposure as well as regional exposure. EPA included this near-roadway standard after their review of the latest health effects studies linking higher short-term NO_2 levels near roadways with adverse health impacts. EPA is also requiring near-roadway (<50 meters) monitoring for urban areas with high populations and heavily trafficked roads, such as Los Angeles County, by no later than January 2013.

On February 18, 2010, SCAQMD staff gave a presentation[27] on the preliminary results of their I-710 near-roadway monitoring study to the I-710 Corridor Project Corridor Advisory Committee (CAC). This study included two month-long intensive monitoring periods (Feb/Mar 2009 and Jul/Aug 2009). The SCAQMD made numerous measurements[28], including 1-hour average NO_2 levels. Those three sites were at a "background" station (Del Amo site), and two sites downwind of the I-710 freeway (on 15 meters downwind and another 80 meters downwind). Both downwind monitors were between the I-710 freeway and the Los Angeles River. SCAQMD's conclusions included: concentrations of NO_2 (and UFPs) were higher 15 meters downwind of the I-710 freeway then 80 meters downwind or upwind of the freeway; and the 1-hr daily maximum NO_2 concentrations can be higher than the new NAAQS level, but concentrations are mostly driven by regional levels. (Note that the new standard is based on the 98th percentile of monitored daily maximums and that exceedences of the NAAQS level does not necessary mean a violation of the standard.) SCAQMD staff has also noted that NO_2 concentrations have historically been declining (based on more stringent vehicle exhaust regulations) and are expected to decrease in the future (based on recently adopted vehicle regulations and reductions required for the SCAB to attain the ozone standard). SCAQMD has projected 1-hour daily maximum NO_2 levels below 80 ppb by 2023 (the expected attainment deadline for the 100 ppb standard).

Table 2.2 below discusses the health effects of the various criteria pollutants.

Table 2.2 Criteria Pollutants, Their Precursors, and Related Health Effects [29]

Pollutant	Health Effects
$PM_{2.5}$ and PM_{10} In addition to directly emitted particulates, oxides of nitrogen (NO_x), oxides of sulfur (SO_x) are precursors of $PM_{2.5}$ and PM_{10}.	Respirable particulates ($PM_{2.5}$ and PM_{10}) pose a serious health hazard, alone or in combination with other pollutants. More than half of the smallest particles inhaled get deposited in the lungs and can cause permanent lung damage. Respirable particles have been found to increase morbidity and mortality via the following adverse health effects: decreased lung function, aggravated asthma, exacerbation of lung and heart disease symptoms, chronic bronchitis and irregular heartbeats. In addition, respirable particles can act as a carrier of absorbed toxic substance.[30]

[27] SCAQMD. Presentation to the I-710 Corridor Project Community Advisory Committee (CAC). February 18, 2010. Presentation can be found at: www.metro.net/projects_studies/I710/images/AQMD-I-710-Air-Monitoring-Study-to-CAC-February-2010.pdf

[28] Measurements included: continuous UFP particle number , black carbon, $PM_{2.5}$ mass, NOx, CO, wind speed, wind direction, temperature, relative humidity; 24-hour samples of PM10 mass, total suspended particulate lead, and organic/elemental carbon (1-in-2 day); daily $PM_{2.5}$ mass (FRM daily samples); and VOC air toxics (4 samples per day).

[29] SCAQMD Final 2007 Air Quality Management Plan, June 2007, (http://www.aqmd.gov/aqmp/07aqmp/aqmp/Complete_Document.pdf).

[30] EPA National Center for Environmental Assessment, particle pollution health affects http://www.epa.gov/air/particlepollution/health.html.

Table 2.2 Criteria Pollutants, Their Precursors, and Related Health Effects [29]

Pollutant	Health Effects
Ozone Ozone is not a directly emitted pollutant from project sources; volatile organic compounds (VOCs) and NO_x are precursors of ozone.	Elevated ozone concentrations have been shown to induce airway irritation, cause airway inflammation, induce wheezing and difficulty breathing, aggravates preexisting respiratory conditions such as asthma, and can lead to permanent lung damage after repeated exposure to elevated concentrations.[31]
Carbon Monoxide (CO)	Carbon monoxide is a colorless and odorless gas that is known to cause aggravation of various aspects of coronary heart disease, dizziness, fatigue, impairment to central nervous system functions, and possible increased risk to fetuses.
Sulfur Dioxide (SO_2)	Sulfur dioxide is known to cause irritation in the respiratory tract, shortness of breath, and can injure lung tissue when combined with fine PM. It also reduces visibility and the level of sunlight.
Nitrogen Dioxide (NO_2)	Long-term exposure to nitrogen dioxide has the potential to decrease lung function and worsen chronic respiratory symptoms and diseases in sensitive population. It has also been associated with cardiopulmonary mortality and emergency room asthma visits. USEPA recently adopted a 1-hour federal standard to address short-term exposure impacts (e.g., adverse respiratory effects), particularly near major roadways.

2.2 Transportation Conformity

Important Note: The project-level CO hot-spot analyses for the project can be found in Appendix H of this report. The PM_{10} and $PM_{2.5}$ Conformity determinations are presented in a separate report prepared by LSA;[32] that report can be found in Appendix I.

Under the 1990 Clean Air Act Amendments, the U.S. Department of Transportation cannot fund, authorize, or approve Federal actions to support programs or projects that are not first found to conform to State Implementation Plan for achieving the goals of the Clean Air Act requirements. Conformity of highway and transit projects with the Clean Air Act takes place on two levels – first, at the regional level and second, at the project level. The proposed project must conform at both levels to be approved.

Regional level conformity is concerned with how well the region is meeting the standards set for CO, NO_2, O_3, and PM. At the regional level, Regional Transportation Plans (RTP) are developed that include all of the transportation projects planned for a region over a period of years, usually at least 20. Based on the projects included in the RTP, an air quality model is run to determine whether or not the implementation of those projects would conform to emission budgets or other tests showing that attainment requirements of the Clean Air Act are met. If the conformity analysis is successful, the regional planning organization and the appropriate federal agencies, such as the Federal Highway Administration, make the determination that the RTP is in

[31] EPA National Center for Environmental Assessment, ground level ozone health affects http://www.epa.gov/air/ozonepollution/health.html.
[32] Need reference

conformity with the State Implementation Plan for achieving the goals of the Clean Air Act. Otherwise, the projects in the RTP must be modified until conformity is attained. If the design and scope of the proposed transportation project are the same as described in the RTP, then the proposed project is deemed to meet regional conformity requirements for purposes of project-level analysis. The I-710 Corridor Project is included in the 2008 RTP as project 1C0401 and has been considered within the RTP's regional conformity analysis. The project has also been included in the Federal Transportation Improvement Plan (2011 FTIP) as project LA0B952, which has also been deemed to conform to the SIP.

Conformity at the project-level also requires "hot spot" analysis if an area is "nonattainment" or "maintenance" for CO and/or particulate matter. A region is a "nonattainment" area if one or more monitoring stations in the region fail to attain the relevant standard. Areas that were previously designated as nonattainment areas but have recently met the standard and have been re-designated by EPA to attainment with a maintenance SIP are called "maintenance" areas. "Hot spot" analysis is essentially the same, for technical purposes, as CO or particulate matter analysis performed for NEPA purposes. Conformity does include some specific standards for projects that require a hot spot analysis. In the South Coast Air Basin, projects must not cause violations of the CO standard, and the project must not cause any increase in the number and severity of $PM_{10}/PM_{2.5}$ standard violations. If a known CO or particulate matter violation is located in the project vicinity, the project must include measures to reduce or eliminate the existing violation(s) as well.

2.3 Mobile Source Air Toxics

The Federal Highway Administration (FHWA) has developed an interim guidance and its update[33] for analyzing mobile source air toxic (MSAT) emissions to meet NEPA requirements. The FHWA developed a tiered approach for analyzing MSAT in NEPA documents, depending on specific project circumstances. The FHWA has identified three levels of analysis:

- No analysis for projects with no potential for meaningful MSAT effects;
- Qualitative analysis for projects with low potential MSAT effects; or
- Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

In March 2001, EPA issued its first MSAT rule, 40 CFR Parts 80 and 86 – Control of Emissions of Hazardous Air Pollutants From Mobile Sources; Final Rule, March 2001 (http://www.epa.gov/EPA-AIR/2001/March/Day-29/a37.htm), which identified 21 MSAT as being hazardous air pollutants that required regulation. A subset of six MSAT was identified as having the greatest influence on human health. In February 2007 EPA issued a second MSAT rule, which generally supported the findings in the first rule and recommended that acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter as having the greatest influence on health. As presented in the I-710 EIR/EIS AQ/HRA protocol (released March 2009) and agreed on by the AQ/HRA Working Group and the Agency Air Technical Working Group (AATWG), the

[33] Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents, FHWA, September, 2009.

I-710 AQ/HRA evaluates the six priority MSAT identified in the first MSAT rule. The September 2009 FHWA guidance references the newest seven MSAT. The Lead Agency confirmed use of original six priority MSAT as the protocol was completed and the analyses were well underway before the new guidance was issued. Thus, the six priority MSAT analyzed in the I-710 AQ/HRA are:

- Diesel exhaust (particulate matter and organic gases)
- Benzene
- 1,3-Butadiene
- Acetaldehyde
- Formaldehyde
- Acrolein

2.4 Greenhouse Gases

While climate change has been a concern since at least 1988, as evidenced by the establishment of the United Nations and World Meteorological Organization's Intergovernmental Panel on Climate Change (IPCC), the efforts devoted to greenhouse gas (GHG) emissions reduction and climate change research and policy have increased dramatically in recent years. These efforts are primarily concerned with the emissions of GHG related to human activity that include carbon dioxide (CO_2), methane, nitrous oxide, tetrafluoromethane, hexafluoroethane, sulfur hexafluoride, HFC-23 (fluoroform), HFC-134a (s,s s 2 –tetrafluoroethane), and HFC-152a (difluoroethane).

In 2002, with the passage of Assembly Bill 1493 (AB 1493), California launched an innovative and pro-active approach to dealing with GHG emissions and climate change at the state level. Assembly Bill 1493 ("the Pavley Standard") requires the California Air Resources Board (CARB) to develop and implement regulations to reduce automobile and light truck GHG emissions. These stricter emissions standards were designed to apply to automobiles and light trucks beginning with the 2009-model year; however, in order to enact the standards California needed a waiver from the U.S. Environmental Protection Agency (EPA). The waiver was denied by EPA in December 2007[34]. However, in January 2009, President Barack Obama issued a directive to the USEPA to reconsider California's request for the waiver. On June 30, 2009 the EPA granted the waiver with a provision specifying that CARB may not hold a manufacturer liable or responsible for any noncompliance caused by the emission debits generated by a manufacturer for the 2009 model year. This waiver allowed California to implement the Pavley standards.

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05 that mandates a reduction in California's GHG emissions to: 1) 2000 levels by 2010, 2) 1990 levels by the 2020 and 3) 80 percent below the 1990 levels by the year 2050. In 2006, this goal was further reinforced with the passage of Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006. AB 32 sets the same overall GHG emissions reduction goals while further mandating that CARB create a scoping plan, which includes market mechanisms, and adoption

[34] California v. Environmental Protection Agency, 9th Cir. Jul. 25, 2008, No. 08-70011.

and enforcement of regulations to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." Several GHG regulations have been adopted and implemented by CARB based on the programs defined in the scoping plan. Some of the regulations that affect the on-road vehicles include 1) the Pavley standard discussed above 2) the low carbon fuel standard that requires a progressive reduction of the full fuel-cycle carbon intensity starting 2010, 3) heavy duty vehicle GHG emissions reduction measure that reduces GHG emissions by adopting an aerodynamic truck design and the 4) tire pressure regulation that requires automotive service providers to check and inflate each vehicle's tires to the recommended tire pressure rating at the time of performing any maintenance or repair service. Other key programs in AB-32 include the renewable fuel portfolio standard (Executive Order S-14-08) that mandates retail suppliers of electric services to increase procurement from renewable energy resources to 33% by 2020 and the cap and trade regulation adopted on October 20, 2011 that sets a statewide limit on sources responsible of 85% of California's greenhouse gas emissions.

Climate change and GHG reduction is a concern at the federal level. In 2002, President George W. Bush set a national policy goal of reducing the GHG emission intensity of the US economy by 18% by 2012. However, no legislation or regulations were enacted to achieve this goal. Rather, the EPA administered a variety of voluntary programs and partnerships with industries producing and utilizing synthetic GHGs to reduce emissions of these potent GHGs. In 2007, California, in conjunction with several environmental organizations and several other states, sued to force the EPA to regulate GHG as a pollutant under the Clean Air Act[35]. The court ruled that GHG does fit within the Clean Air Act's definition of a pollutant, and that the EPA does have the authority to regulate GHG. On May 18, 2009, President Obama announced the enactment of a 35.5 mpg fuel economy standard for automobiles and light duty trucks, which will take effect in 2012. The EPA and the National Highway Traffic Safety Administration (NHTSA) adopted this standard in April, 2010[36]. Further in August, 2011 EPA and NHTSA adopted CO_2 emissions and fuel economy standards for medium and heavy duty vehicles, which would have the potential to reduce GHG emissions by nearly 250 million metric tons and save ~500 million barrels of oil over the life of vehicles sold during 2014 to 2018.[37]

The Natural Resources Agency coordinated the preparation of amendments the CEQA guidelines to address the analysis and mitigation of greenhouse gas emissions. These amendments became effective on March 18, 2010. The amendments clarified the following[38]

- Lead agencies must analyze the greenhouse gas emissions of proposed projects, and must reach a conclusion regarding the significance of those emissions. (See CEQA Guidelines § 15064.4.)
- When a project's greenhouse gas emissions may be significant, lead agencies must consider a range of potential mitigation measures to reduce those emissions. (See CEQA Guidelines § 15126.4(c).)

[35] Massachusetts vs. Environmental Protection Agency et al., 549 U.S. 497 (2007)
[36] Available at http://www.epa.gov/oms/climate/regulations/420f10014.htm (accessed October, 2011)
[37] Available at http://www.epa.gov/otaq/climate/documents/420f11031.pdf (accessed October, 2011)
[38] Available at http://www.opr.ca.gov/s_ceqaandclimatechange.php (accessed October, 2011)

- Lead agencies must analyze potentially significant impacts associated with placing projects in hazardous locations, including locations potentially affected by climate change. (See CEQA Guidelines § 15126.2(a).)
- Lead agencies may significantly streamline the analysis of greenhouse gases on a project level by using a programmatic greenhouse gas emissions reduction plan meeting certain criteria. (See CEQA Guidelines § 15183.5(b).)
- CEQA mandates analysis of a proposed project's potential energy use (including transportation-related energy), sources of energy supply, and ways to reduce energy demand, including through the use of efficient transportation alternatives. (See CEQA Guidelines, Appendix F.)

This Report includes a special analysis of traffic-related GHG emissions of the project alternatives. Other guideline items above will be addressed in the DEIR/DEIS or related technical reports. Caltrans and its parent agency, the Business, Transportation, and Housing Agency, have taken an active role in addressing GHG emission reduction and climate change. Recognizing that 98 percent of California's GHG emissions are from the burning of fossil fuels and 40 percent of all human made GHG emissions are from transportation, Caltrans has created and is implementing its December 2006 Climate Action Program[39]. In July 2011, Caltrans revised its Standard Environmental Reference (SER) to include analysis of GHG emissions. The I-710 Corridor Project AQ/HRA Protocol had already included the analysis of traffic-related GHG emissions as a special Project analysis; results of this analysis can be found in Section 4.4.

[39] Caltrans Climate Action Program available at www.dot.ca.gov/hq/tpp/offices/ogm/key_reports_files/State_Wide_Strategy/Caltrans_Climate_Action_Program.pdf

3 Affected Environment

3.1 Climate

The project lies in the Los Angeles County area. The period of May through October is warm to hot and dry with average high temperatures of 74–84°F and lows of 58–66°F, however temperatures frequently exceed 90 °F and occasionally reach 100°F in inland areas (away from the moderating effect of the ocean). The period of November through April is mild and somewhat rainy with average high temperatures of 68-73°F and lows of 48–53°F, but temperatures can occasionally drop to the low 40s or be as high as 80 °F for a few days during winter. The area averages 15 inches (381.00 mm) of precipitation annually, which mainly occurs during the winter and spring (November through April) with generally light rain showers, but sometimes as heavy rainfall and thunderstorms. The coast gets slightly less rainfall, while the mountains get slightly more.

Wind speed and direction play a major role in the dispersion of pollutants in the atmosphere. Since the project is 18 miles long, it is difficult to characterize the wind speed and direction using a single meteorological station. Figure 3.1 presents wind roses for four representative meteorological stations along the I-710 freeway. (For further discussion of how these stations were identified and used in the AQ/HRA analyses, see Appendix D, Attachment 1).

3.2 Ambient Air Quality in the Project Area

3.2.1 Monitoring Network

CARB and SCAQMD have the primary responsibility for maintaining and operating a network of ambient air quality monitoring stations in the SCAB. The locations of monitors within this network, which are sited within the southern part of Los Angeles County, are shown on Figure 3.2. In addition, the Port of Los Angeles and the Port of Long Beach have recently developed and begun implementing (since February 2005 at the POLA and October 2006 at the POLB) their own program to monitor criteria pollutants[40] in the San Pedro Bay area.[41] However, the air quality monitoring data from the POLA/POLB monitors were not used in the analysis as they are not SCAQMD approved monitors and/or were not proximate to the modeled sources.

3.2.2 Recent Monitoring Data

Because of the central locations of these stations within the I-710 corridor project area (see Figure 3.3), the presentation and discussion of existing air quality in the project area focuses on air quality measurements at the CARB/SCAQMD North Long Beach, Lynwood, and Los Angeles-North Main Street stations. Measurements obtained at these stations during the most recent three years of available data are summarized in Table 3.1. These results are consistent with the overall attainment challenges within the entire South Coast Air Basin (see discussion of air quality in the 2007 AQMP).[42] For informational purposes monitoring data for the years 2003 to 2005 are provided in Table 3.2.

[40] Including NO_2, SO_2, O_3, CO, PM_{10}, and $PM_{2.5}$.
[41] Additional information is available online at http://caap.airsis.com/, including a map of the San Pedro Ports monitoring network (http://caap.airsis.com/MapView.aspx), as well as reports of both historical and real-time data.
[42] See Chapter 2 of the 2007 AQMP, available online at: http://www.aqmd.gov/aqmp/07aqmp/draft/07aqmp.pdf.

Table 3.1 Summary of 2006-2008 Ambient Air Monitoring Results, for the Los Angeles-North Main Street, North Long Beach, and Lynwood[1]

		LA-North Main Street			North Long Beach			Lynwood		
Pollutant	**Ambient air quality**	**2006**	**2007**	**2008**	**2006**	**2007**	**2008**	**2006**	**2007**	**2008**
CO (ppm)	1-hour maximum	3	3	3	4	3*	3	8	8	6*
	Days of federal exceedances (> 35 ppm)	0	0	0	0	0*	0	0	0	0
	Days of state exceedances (> 20 ppm)	0	0	0	0	0*	0	0	0	0
	8-hour maximum	2.6	2.2	2.1	3.4	2.6*	2.6	6.4	5.1	4.3*
	Days of federal exceedances (> 9 ppm)	0	0	0	0	0*	0	0	0	0
	Days of state exceedances (> 9 ppm)	0	0	0	0	0*	0	0	0	0
O_3 (ppm)	1-hour maximum	0.11	0.115	0.109	0.08	0.099	0.093	0.09	0.102	0.078*
	Days of state exceedances (> 0.09 ppm)	8	3	3	0	1	0	0	1	0*
	8-hour maximum	0.79	0.102	0.09	0.058	0.073	0.074	0.066	0.077	0.060*
	Days of federal exceedances (> 0.08 ppm) [2,3]	0	2	1	0	0	0	0	0	0*
	Days of federal exceedances (> 0.075 ppm) [2,3]	--	3	3	--	0	0	--	1	0*
	Days of state exceedances (> 0.07 ppm)	4	6	7	0	1	1	0	2	0*
NO_2 (ppm)	1-hour maximum	0.11	0.10	0.12	0.10	0.11	0.13	0.14	0.10	0.12*
	Days of State exceedances (> 0.25 ppm) [4]	0	0	0	0	0	0	0	0	0
	Annual average	0.0288	0.0299	0.0275	0.0215	0.0207	0.0208	0.0306	0.0291	0.0301*
	Exceedance of federal standard (> 0.0534 ppm)	No	No	No	No	No	No	No	No	No*
	Exceedance of state standard (> 0.030 ppm) [4]	--	--	No	--	--	No	--	--	Yes*
SO_2 (ppm)	1-hour maximum	0.03	0.01	0.01	0.03	0.11	0.09	--	--	--
	Days of state exceedances (> 0.25 ppm)	0	0	0	0	0	0	--	--	--
	24-hour maximum	0.006	0.003	0.002	0.01	0.011	0.012	--	--	--
	Days of federal exceedances (> 0.14 ppm) [5]	0	0	0	0	0	0	--	--	--
	Days of state exceedances (> 0.04 ppm)	0	0	0	0	0	0	--	--	--
	Annual average	0.0019	0.0009	0.0003	0.0012	0.0027	0.0022	--	--	--
	Exceedance of federal standard (> 0.03 ppm)	No	No	No	No	No	No	--	--	--
PM_{10} ($\mu g/m^3$)	24-hour maximum [6]	59	78	66*	78	75	62	--	--	--
	Days of federal exceedances (> 150 $\mu g/m^3$) [6]	0	0	0	0	0	0	--	--	--
	Days of state exceedances (> 50 $\mu g/m^3$) [6]	3	5	2*	6	5	1	--	--	--
	Annual average [6,7]	30.3	33.3	30.9*	31.1	30.2	29.1	--	--	--
	Exceedance of state standard (> 20 $\mu g/m^3$) [6]	Yes	Yes	Yes*	Yes	Yes	Yes	--	--	--

Table 3.1 Summary of 2006-2008 Ambient Air Monitoring Results, for the Los Angeles-North Main Street, North Long Beach, and Lynwood[1]

		LA-North Main Street			North Long Beach			Lynwood		
Pollutant	**Ambient air quality**	**2006**	**2007**	**2008**	**2006**	**2007**	**2008**	**2006**	**2007**	**2008**
$PM_{2.5}$ (µg/m³)	24-hour maximum	56.2	64.2	78.3	58.5*	82.9	57.2	55.0	49.0	44.2
	Days of federal exceedances (> 35 µg/m³) [8]	11	20	10	5*	12	8	4	4	3
	Annual average	15.6	16.8	15.7	14.2*	14.6	14.2	16.7	15.9	15.5
	Exceedance of federal standard (> 15 µg/m³)	Yes	Yes	Yes	No*	No	No	Yes	Yes	Yes
	Exceedance of state standard (> 12 µg/m³)	Yes	Yes	Yes	Yes*	Yes	Yes	Yes	Yes	Yes
Lead (µg/m³)	Monthly-average maximum	0.02	0.04	0.02	0.01	0.02	0.01	0.02	0.03	0.03
	Exceedance of state standard (> 1.5 µg/m³)	No	No	No	No	No	No	No	No	No
	Quarterly-average maximum	0.01	0.03	0.02	0.01	0.01	0.01	0.02	0.02	0.02
	Exceedance of federal standard (> 0.15 µg/m³) [9]	No	No	No	No	No	No	No	No	No

Notes:
[1] Source: http://www.aqmd.gov/smog/historicaldata.htm (accessed September 2011) for Los Angeles-North Main Street, North Long Beach, and Lynwood stations. Key: "*" refers to data points corresponding to less than 12 full months of data, and that therefore may not be representative. "–" means that the data was unavailable.
[2] The federal 1-hour ozone standard was revoked and replaced by the 8-hour standard, effective June 15, 2005.
[3] EPA revised the federal 8-hour ozone standard from 0.08 ppm to 0.075 ppm effective May 27, 2008. Attainment of this standard is based on the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year.
[4] The California Air Resources Board revised the NO_2 1-hour state standard from 0.25 ppm to 0.18 ppm and established a new annual standard of 0.030 ppm effective March 20, 2008.
[5] Federal SO_2 standards also include a 3-hour average 0.50 ppm threshold. This threshold was not exceeded.
[6] After exclusion of a number of measurements affected by exceptional events in accordance with the EPA Exceptional Event Rule (see table footnotes at http://www.aqmd.gov/smog/AQSCR2007/aq07card.pdf).
[7] EPA revoked the federal annual PM_{10} standard effective December 17, 2006.
[8] EPA revised the federal 24-hour $PM_{2.5}$ standard from 65 µg/m³ to 35 µg/m³, effective December 17, 2006. Attainment of this standard is based on the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area.
[9] EPA revised the federal lead standard (effective October 15, 2008) from a quarterly average of 1.5 µg/m³ to a rolling 3-month average of 0.15 µg/m³.

Table 3.2 Summary of 2003-2005 Ambient Air Monitoring Results, for the Los Angeles-North Main Street, North Long Beach, and Lynwood[1]

		LA-North Main Street			North Long Beach			Lynwood		
Pollutant	Ambient air quality	2003	2004	2005	2003	2004	2005	2003	2004	2005
CO (ppm)	1-hour maximum	6	4	4	6	4	4	12	10	7
	Days of federal exceedances (> 35 ppm)	0	0	0	0	0	0	0	0	0
	Days of state exceedances (> 20 ppm)	0	0	0	0	0	0	0	0	0
	8-hour maximum	4.6	3.2	3.1	4.7	3.4	3.5	7.3	6.7	5.9
	Days of federal exceedances (> 9 ppm)	0	0	0	0	0	0	0	0	0
	Days of state exceedances (> 9 ppm)	0	0	0	0	0	0	0	0	0
O_3 (ppm)	1-hour maximum	0.152	0.110	0.121	0.099	0.090	0.091	0.081	0.084	0.111
	Days of state exceedances (> 0.09 ppm)	11	7	2	1	0	0	0	0	1
	8-hour maximum	0.088	0.092	0.098	0.071	0.075	0.068	0.063	0.072	0.081
	Days of federal exceedances (> 0.08 ppm) [2,3]	2	1	1	0	0	0	0	0	0
	Days of federal exceedances (> 0.075 ppm) [2,3]	--	--	--	--	--	--	--	--	--
	Days of state exceedances (> 0.07 ppm)	--	7	2	--	0	0	--	0	1
NO_2 (ppm)	1-hour maximum	0.16	0.16	0.13	0.14*	0.12	0.14	0.13	0.10	0.11
	Days of State exceedances (> 0.25 ppm) [4]	0	0	0	0*	0	0	0	0	0
	Annual average	0.0338	0.0328	0.0278	0.0288*	0.0280	0.0241	0.0312	0.0301	0.0312
	Exceedance of federal standard (> 0.0534 ppm)	No	No	No	No*	No	No	No	No	No
	Exceedance of state standard (> 0.030 ppm) [4]	--	--	--	--	--	--	--	--	--
SO_2 (ppm)	1-hour maximum	0.05*	0.08	0.07	0.03	0.04	0.04	--	--	--
	Days of state exceedances (> 0.25 ppm)	0*	0	0	0	0		--	--	--
	24-hour maximum	0.006*	0.015	0.010	0.008	0.012	0.010	--	--	--
	Days of federal exceedances (> 0.14 ppm) [5]	0*	0	0	0	0	0	--	--	--
	Days of state exceedances (> 0.04 ppm)	0*	0	0	0	0	0	--	--	--
	Annual average	--	--	--	--	--	--	--	--	--
	Exceedance of federal standard (> 0.03 ppm)	--	--	--	--	--	--	--	--	
PM_{10} ($\mu g/m^3$)	24-hour maximum [6]	81	72	70	63	72	66	--	--	--
	Days of federal exceedances (> 150 $\mu g/m^3$) [6]	0	0	0	0	0	0	--	--	--

Table 3.2 Summary of 2003-2005 Ambient Air Monitoring Results, for the Los Angeles-North Main Street, North Long Beach, and Lynwood[1]

		LA-North Main Street			North Long Beach			Lynwood		
Pollutant	**Ambient air quality**	**2003**	**2004**	**2005**	**2003**	**2004**	**2005**	**2003**	**2004**	**2005**
$PM_{2.5}$ (µg/m^3)	Days of state exceedances (> 50 µg/m^3) [6]	6	5	4	4	4	5	--	--	--
	Annual average [6,7]	34.6	32.7	29.6	32.8	33.1	29.6	--	--	--
	Exceedance of state standard (> 20 µg/m^3) [6]	Yes	Yes	Yes	Yes	Yes	Yes	--	--	--
$PM_{2.5}$ (µg/m^3)	24-hour maximum	83.7	75	73.7	115.2	66.6	53.9	54.8	55.8	54.6
	Days of federal exceedances (> 65 µg/m^3) [8]	5	2	2	3	1	0	0	0	0
	Annual average	21.3	19.6	18.1	18.0	17.6	16.0	20.2	18.5	17.5
	Exceedance of federal standard (> 15 µg/m^3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Exceedance of state standard (> 12 µg/m^3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead (µg/m^3)	Monthly-average maximum	0.15	0.03	0.02	0.10	0.02	0.01	0.04	0.03	0.03
	Exceedance of state standard (> 1.5 µg/m^3)	No	No	No	No	No	No	No	No	No
	Quarterly-average maximum	0.15	0.03	0.02	0.05	0.01	0.01	0.04	0.03	0.03
	Exceedance of federal standard (> 0.15 µg/m^3) [9]	No	No	No	No	No	No	No	No	No

Notes:
[1] Source: http://www.aqmd.gov/smog/historicaldata.htm (accessed September 2011) for Los Angeles-North Main Street, North Long Beach, and Lynwood stations. Key: "*" refers to data points corresponding to less than 12 full months of data, and that therefore may not be representative. "–" means that the data was unavailable.
[2] The federal 1-hour ozone standard was revoked and replaced by the 8-hour standard, effective June 15, 2005.
[3] EPA revised the federal 8-hour ozone standard from 0.08 ppm to 0.075 ppm effective May 27, 2008. Attainment of this standard is based on the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year.
[4] The California Air Resources Board revised the NO_2 1-hour state standard from 0.25 ppm to 0.18 ppm and established a new annual standard of 0.030 ppm effective March 20, 2008.
[5] Federal SO_2 standards also include a 3-hour average 0.50 ppm threshold. This threshold was not exceeded.
[6] After exclusion of a number of measurements affected by exceptional events in accordance with the EPA Exceptional Event Rule (see table footnotes at http://www.aqmd.gov/smog/AQSCR2007/aq07card.pdf).
[7] EPA revoked the federal annual PM_{10} standard effective December 17, 2006.
[8] EPA revised the federal 24-hour $PM_{2.5}$ standard from 65 µg/m^3 to 35 µg/m^3, effective December 17, 2006. Attainment of this standard is based on the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area.
[9] EPA revised the federal lead standard (effective October 15, 2008) from a quarterly average of 1.5 µg/m^3 to a rolling 3-month average of 0.15 µg/m^3.

3.3 Asbestos Impacts during Construction

The project is located in Los Angeles County, which is among the counties listed as containing serpentine and ultramafic rock. However, the project site is not located within an area known to contain naturally occurring asbestos (NOA). Therefore, the impact from NOA during project construction would be minimal to none.

4 Environmental Consequences

4.1 Introduction

During construction, short-term degradation of air quality may occur due to the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and other activities related to construction. Site preparation and roadway construction would involve clearing, cut-and-fill activities, grading, removing or improving existing roadways, and paving roadway surfaces. Construction-related effects on air quality from most highway projects would be greatest during the site preparation phase because most engine emissions are associated with the excavation, handling, and transport of soils to and from the site. In addition to dust-related PM_{10} emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate CO, SO_2, NO_x, VOCs and some soot particulate (PM_{10} and $PM_{2.5}$) in exhaust emissions.

During project operations, CO, SO_2, NO_x, VOCs, PM_{10} and $PM_{2.5}$ emissions will be released in the form of exhaust emissions, running evaporative losses, tire wear, and brake wear due to traffic movement on the freeway. Emissions of PM_{10} and $PM_{2.5}$ will also occur in the form of re-entrained dust due to movement of traffic on paved roadways. Toxic air contaminants such as Diesel Particulate Matter, Benzene, Acrolein, Acetaldehyde, Formaldehyde, 1,3-butadiene will also be emitted from the gasoline and diesel fueled traffic moving on the freeway and other roadways during project operations. This section discusses the air quality and health risk impacts associated with the project construction and operation.

NOTE: Multiple metrics are used to assess the AQ/HRA impacts of the project alternatives. A single metric cannot, and should not, be used to evaluate the full AQ/HRA impacts of any project alterative. The results of the different analyses should be considered together to give a fuller and more comprehensive understanding of project alternative AQ/HRA impacts.

As mentioned earlier, the project is a joint venture of several agencies associated with transportation and goods movement in the greater Los Angeles area and the subject of great interest to the local communities and other stakeholders involved in the I-710 Corridor Project. Metro, Caltrans and the other Funding Partners recognized that stakeholders wanted special analyses beyond the standard Caltrans analyses typically done for roadway/freeway projects (as described in Caltrans' Standard Environmental Reference at www.dot.ca.gov/ser/vol1/sec3/physical/ch11air/chap11.htm). Thus, additional special project analyses over and above the standard analyses done for freeway projects were conducted because of the unique goods movement component of the project and the air quality purpose of the project.

Table 4.1 below presents a summary of the analyses that were conducted for this project. The table denotes the standard Caltrans SER analyses ("standard") and special I-710 project-only analyses ("special").

Table 4.1 I-710 EIR/EIS AQ/HRA Analysis Metrics

	Analysis Type	Pollutants	Reporting Unit	Reporting Format
1	**STANDARD** (for long-term construction projects) Criteria Pollutant Mass Emissions - Construction	NO_x, VOC, PM_{10}, $PM_{2.5}$, CO, SO_2	lbs/day	Summary tables showing mass emissions for Alternatives 5A and 6A/B.
2	**STANDARD** Criteria Pollutant Mass Emissions – Traffic	NO_x, VOC, PM_{10}, $PM_{2.5}$, CO, SO_2	lbs/day	Summary tables showing incremental mass emission changes for the I-710 (standard), area of interest (special), and SCAB (special) Spatial emission figures for select criteria pollutants (special)
3	**SPECIAL ANALYSIS** Criteria Pollutant Concentrations – Traffic activity on the I-710 and Freight Corridor (AERMOD Modeling)	NO_2 (1-hr, annual), PM_{10} (24-hr, annual), $PM_{2.5}$ (24-hr), CO (1-hr, 8-hr)	ppm, ug/m^3	Incremental concentration change tables and figures
4	**STANDARD** Mobile Source Air Toxic (MSAT) Emissions – Traffic	6 priority MSAT: 1. DPM (incl. organics) 2. Acetaldehyde 3. Acrolein 4. Benzene 5. 1,3-Butadiene 6. Formaldehyde	lbs/hr and lbs/yr	Summary tables showing incremental mass emission changes for the I-710 (standard), area of interest (special) and SCAB (special) Spatial emission figures for DPM (special)
5	**SPECIAL ANALYSIS** MSAT health risk assessment based on AERMOD modeling - Traffic activity on the I-710 and Freight Corridor	Cancer Risk, Chronic and Acute Hazard Indices, Cancer Burden	Cancer risk: # in a million All others: unitless	Tables and figures showing incremental changes
6	**SPECIAL ANALYSIS*** Greenhouse Gas Emissions – Traffic	CH_4, N_2O, CO_2	tons/year of CO_2 equivalent	Summary tables showing incremental mass emission changes for SCAB
7	**SPECIAL ANALYSIS** PM Mortality Impacts	Total $PM_{2.5}$ as a surrogate for mortality impacts	Qualitative analysis	Qualitative analysis
8	**SPECIAL ANALYSIS** Ultrafine particulates (particulates less than 0.1μ in diameter)	Exhaust $PM_{2.5}$ as a surrogate for ultrafine particulates	Qualitative analysis	Qualitative analysis
9	**STANDARD** (Transportation Conformity)	CO, $PM_{2.5}$, PM_{10}	ppm, μg/m^3	Incremental concentration change, tables and figures

* After approval of the I-710 Corridor Project AQ/HRA Protocol (released March 2009), Caltrans included analysis of GHGs as part of its standard analyses in July 2011.

4.2 Construction Impacts

4.2.1 Construction Emission Estimation Methodology

The emissions of criteria pollutants from construction activities were calculated using the Road Construction Emissions Model, Version 6.3.2 (construction emission model) developed by Sacramento Metropolitan Air Quality Management District (SMAQMD). The model can be used to estimate both vehicle/equipment exhaust and fugitive dust. The methodology used for estimating fugitive dust emissions is a simplified method that is based on the maximum area disturbed per day. The vehicle exhaust emissions are estimated using the equipment activity data and emission factors derived from OFFROAD and EMFAC model runs. However, the emission factors from OFFROAD and EMFAC used in the model are specific to Sacramento area. Therefore, the emission factors in the construction emission model for vehicle exhaust were replaced with the emission factors developed by SCAQMD to quantify the exhaust emissions. The construction of the project was analyzed for seven segments (created for preliminary engineering of the project) along the18-mile length of the Project. Construction may or may not occur on different segments (or parts of these segments) over the same time interval and is expected to take place over several years (8 to 15). However, to have a conservative estimate of peak-day emissions, construction emissions were calculated for a “worst-case” scenario that assumed, among other things, that construction would occur simultaneously in the seven segments over a short period of time (7.3 years). Details about the assumptions, method, and results of this “worst-case” construction scenario can be found in Appendix B.

4.2.2 Criteria Pollutant Emission Estimates

Table 4.2 below summarizes the peak-day emissions of criteria pollutants for all four Build alternatives for the worst-case construction scenario. All criteria pollutant single-segment peak-day emissions are below the SCAQMD threshold except NOx. The single-segment peak-day emissions may be spread out along the entire length of that segment (1.4 to 4.7 miles). Construction phasing and additional mitigation measures, if feasible, could reduce peak-day emissions.

Table 4.2 Criteria Pollutant Mass Emissions for Construction (Peak Day)

Pollutant	Peak Day (All Segments Total) (lbs/day)		Peak Day (Maximum Single Segment) (lbs/day)		SCAQMD CEQA Threshold lbs/day
	Alt. 5A	Alt. 6A/B/C	Alt. 5A	Alt. 6A/B/C	
NO_x	1,364	1,510	287	287	100
CO	986	1,001	177	177	550
PM_{10}	435	482	69	69	150
Exhaust	*25*	*27*	*4*	*4*	-
Fugitive dust	*410*	*455*	*65*	*65*	-
$PM_{2.5}$	117	129	21	21	55
Exhaust	*52*	*57*	*11*	*11*	-
Fugitive dust	*65*	*72*	*10*	*10*	-
ROG	193	213	40	40	75

Notes
Emissions are from construction equipment/activities
No green construction equipment
Values for exhaust and fugitive dust are not peak values, but represent the constituents of PM_{10} and $PM_{2.5}$ on the peak day
Assumed that all seven segments are constructed simultaneously (Maximum construction duration 87.4 months)
All Numbers are rounded to an integer value

4.3 Operation Impacts

4.3.1 Criteria Pollutant Emissions-Traffic

Mass emissions of criteria pollutants (NO_x, VOC, PM_{10}, $PM_{2.5}$, CO, SO_x) from traffic were calculated for the I-710 freeway to determine the impact of the proposed project on the surrounding area. In addition, the SCAB mass emissions and mass emissions for the Area of Interest (AOI) were also evaluated to determine the impact of the proposed I-710 project on a regional scale. Figure 4.1 presents the SCAB, AOI, Project study area and I-710 freeway. Six different scenarios were analyzed; baseline year 2008, No Build Alternative in 2035 (Alternative 1), Alternative 5A, Alternative 6A, Alternative 6B, and Alternative 6C.

4.3.2 Emission Estimation Methodology

There are two main steps in quantification of emissions from freeway/roadway traffic as presented below:

- Calculating the vehicle activity for various vehicle types in terms of speed and vehicle miles traveled (VMT); and
- Identifying emission factors for the various vehicle types.

I-710 Traffic Model Output

The vehicle activity data was obtained from I-710 Traffic Model runs, which is based on the Southern California Association of Governments (SCAG) regional traffic model. Traffic was modeled using the SCAG model by Cambridge Systematics, Inc. for all the six project scenarios. Four different peak time periods were evaluated in the model: AM (6 AM – 9 AM), Mid-day (9 AM - 3 PM), PM (3 PM – 7 PM) and Night time (7 PM – 6 AM). The I-710 Traffic Model is composed of a series of traffic links that represent the flow of traffic from one geographic point to another. The output of the I-710 Traffic Model is in the form of traffic flows and an average speed for each traffic link amongst other parameters. This model output data will be hereinafter referred to as "The I-710 Traffic Model data."

Post-Processed Traffic Data

The I-710 Traffic Model modeling results were further post processed using actual traffic counts at specific locations on and around the I-710 freeway to provide refined traffic data for the I-710 mainline freeway, freight corridor, and certain other roadway segments and intersections. Note that these post-processed results cannot be applied to estimate regional mass emissions. Post-processed traffic data were used in the AERMOD modeling of the I-710 Corridor to make the air quality and health risk impacts analyses of the I-710 freeway (mainline and freight corridor) emissions consistent with the refined traffic impact analysis. This data will be hereinafter referred to as "post-processed" traffic data.

Emission Factors

EMFAC2007 version 2.3 (EMFAC) was used to develop emission factors for the various criteria pollutants[43]. The EMFAC model was run for both the baseline year 2008 and build-out year 2035. EMFAC has a variety of user options, which allow the user to analyze on-road emissions under different conditions. For the I-710 project the following options were used;

- Operation Parameters
  - Geographic area chosen: South Coast Air Basin.
  - Calendar Year: Baseline year 2008; 2035 analysis year for the No Build Alternative, Alternative 5A, Alternative 6A, Alternative 6B, and Alternative 6C.
  - Season: Annual average season was used which represents an average of all monthly inventories.
  - Temperature: 60º F was chosen and represents an average annual temperature.
  - Relative Humidity: 40%.
- Method

  The project domain resides with the SCAB and as such the "Simple-Average" option was used as the calculation, which uses area averaging to calculate average parameters for temperature, speed, relative humidity and I/M.
- Modes

[43] EMFAC2011 was released by CARB on September 19, 2011, after emissions had been calculated. In addition, EMFAC 2007 is the emission factor model used in the most recent AQMP (2007 AQMP). Emission factors in this analysis have been adjusted for currently adopted non-GHG rules, as in EMFAC2011. See Section 4.3.2.4.

The model was run in the "EMFAC" mode to generate emission factors in grams of pollutant emitted per vehicle activity [grams per vehicle mile travelled and grams/hr].

Appendix C presents more details on the emission calculations methodology, presents tables providing the emission factors, emission calculations and the EMFAC input/output file.

EMFAC Adjustments for 2035 Emission Factors

EMFAC2007 does not account for rules and regulations enacted by the California Air Resources Board after 2007. Two notable regulations not captured in EMFAC are those designed to reduce NO_x and diesel particulate matter (DPM). The Statewide Bus and Truck Rule and Drayage Truck Rule will require fleets to reduce DPM and NO_X emissions. Additionally, the Ports of Los Angeles and Long Beach have enacted the Clean Port Truck Program (CPTP) mandating trucks that operate within the Ports to reduce DPM emissions by meeting set standards during phase in years. Therefore, adjustments were made to EMFAC emission factors to account for the Statewide Bus and Truck Rule and CPTP. Based on a comparison made between the CPTP and the Drayage rule it was determined that the CPTP is more stringent that the Drayage Rule and hence no adjustments were made for Drayage rule. Appendix C describes the adjustments in detail. It should also be noted that none of the other air quality improvement concepts or projects proposed by the ports Clean Air Action Plan (e.g., control measures for ocean going vessels (OGVs), cargo handling equipment, drayage trucks, etc.) are accounted for in the analysis herein.

4.3.3 Summary of Criteria Pollutant Emission Estimates – Traffic

The incremental emissions of criteria pollutants for SCAB, AOI and the I-710 freeway as compared to the 2008 baseline are presented in Tables 4.3a through 4.3c. These emissions were calculated using the I-710 Traffic model data. The SCAQMD CEQA regional mass emission significance thresholds have also been provided as additional information in Table 4.3a. All criteria pollutants, except total PM_{10} and SO_2, show decreases for the 2035 alternatives when compared to the 2008 baseline. These results indicate that reduction in emissions, due to improved vehicle technology, are far greater than the increase in emissions, resulting from VMT increases in 2035.

Total PM_{10} emissions consist of vehicle exhaust emissions and entrained road dust emissions. In this project, entrained road dust emissions were calculated using the latest EPA AP-42 equation, which was approved in February 2011 (see Appendix C for more details). This equation assumes that entrained dust emissions are directly proportional to vehicle miles travelled, thereby indicating that roads have an infinite silt reservoir. The SCAQMD used a different approach in their 2007 AQMP. Based on their analysis, heavily-traveled freeways and arterial roadways have a finite silt reservoir and that additional traffic (VMT) in future years will NOT increase entrained PM on these roads. After the I-710 Corridor Project emission calculations were completed, SCAQMD has proposed a modified methodology for entrained PM emissions as part of their 2012 AQMP development. In SCAQMD's proposed methodology, 2008 PM_{10} and $PM_{2.5}$ estimates will be lower, particularly $PM_{2.5}$ estimates. Most importantly, future year entrained PM will remain constant unless the roadway is lengthened. The EPA methodology used in this project is conservative; thus it can reasonably be stated that the entrained dust emissions maybe overstated and actual PM emissions would likely more closely reflect the exhaust PM emissions. The exhaust portion of PM_{10} emissions for all 2035 alternatives follow a trend similar to other criteria pollutants; it decreases from the 2008 baseline PM_{10} exhaust emissions. Total $PM_{2.5}$ emissions for Alternative 6A as compared to 2008 baseline, on the I-710 freeway, also increase for the same reasons previously explained for the total PM_{10} emissions. The increase in the entrained $PM_{2.5}$, for this alternative on the I-710 freeway, was higher than the decrease seen in the exhaust $PM_{2.5}$ emissions.

SO_2 emissions are formed by the conversion of fuel sulfur into oxides of sulfur during the combustion process. As a result SO_2 exhaust emissions are extremely sensitive to changes in fuel sulfur content. California already has ultra-low sulfur fuel standards in place. So, there will be no significant change in the fuel sulfur content from 2008 to 2035. However, increases in VMTs in 2035 directly translates to increase fuel usage, which in turn results in greater SO_2 emission in the SCAB, AOI and I-710 freeway. The primary factor driving the reduction in emissions of other criteria pollutants, improvements in vehicle technology, is not a significant player for SO_2 exhaust emissions because these emissions are only sensitive to changes in fuel sulfur content. Therefore, the SO_2 emissions for all 2035 alternatives show similar increases of about 0.65 tons/day. It should be noted that the SCAQMD has recently adopted amendments to its SO_x RECLAIM rule that will further reduce SO_x emissions by about 5.4 tons/day by 2019 (3 tons/day in 2013, 4 tons/day in 2014 and 5 tons/day in 2017). In addition, implementation of CARB rules and the Ports' Clean Air Action Plan is projected to reduce SO_x emissions from other goods movement sources (e.g. ocean-going vessel) over 20 tons/day. Most SO_x RECLAIM and ocean-going vessel emission reductions will occur upwind of the I-710 study area. These SO_x reductions from non-traffic related sources (e.g., ships, refineries) are not accounted for in this study.

Figures 4.2 through 4.6 show the change in NO_x emissions for 2035 alternatives as compared to the 2008 baseline and 2035 Build Alternatives as compared to the 2035 No Build Alternative. These gridded mass emission figures have been plotted by adding the NO_x emissions from links or part of links present in a grid size of 0.25 miles by 0.25 miles. The NO_x emissions, for all 2035 alternatives as compared to 2008 baseline, decrease on the freeways, arterials and roadways in the AOI in spite of the increase in the VMT. This occurs due to the improvement in vehicle technology driven by state and local programs/regulations.

A comparison of the NO_x emissions for Alternatives 6A, 6B and 6C to the No Build Alternative (Figures 4.4 to 4.6) shows additional reductions in emissions on I-605, I-105, I-110 and CA-91 due to shifting of trucks from these freeways to the I-710 freight corridor. We do however observe fewer reductions in NO_x emissions for these alternatives in the northern section of the I-710 freeway and CA-60 where the freight corridor ends and trucks move off the I-710. The comparison of Alternative 6A to the No Build Alternative baseline (Figure 4.4) shows a lower level of NO_x emission reductions (compared to 2008) along the I-170 freeway due to increased flow of trucks with the introduction of the freight corridor. This effect disappears for Alternatives 6B and 6C when the freight corridor is a zero-emissions roadway.

Figures 4.7 to 4.11 present gridded mass emission plots for total and exhaust $PM_{2.5}$ emissions. These plots were made following the methodology described above for the NO_x mass emission plots. Total $PM_{2.5}$ emissions are a sum of the vehicle exhaust emissions[44] and entrained dust emissions. The comparison of total $PM_{2.5}$ mass emissions in the 2035 alternative to 2008 baseline shows decreases in emissions on the freeways, arterials and local roadways near the I-710. These emissions also decrease on the I-170 freeway for all alternatives except Alternative 6A. As described earlier for Alternative 6A, the increase in the $PM_{2.5}$ entrained dust emissions as compared to 2008 baseline far exceeds the decreases seen in the exhaust $PM_{2.5}$ emissions along the I-710 freeway. The exhaust $PM_{2.5}$ mass emissions plots comparing the 2035 alternatives to the 2008 baseline show decreases on the I-710 freeway as well. These follow a trend similar to the NO_x plots.

Total $PM_{2.5}$ emissions for the build alternatives compared to the No Build Alternative show increased in emissions on the I-710 freeway. This is due to the increased mobility and capacity of the freeway, which results in increased exhaust and entrained dust emissions. For Alternatives 6A, 6B and 6C we do see decreases in emissions on sections of nearby freeways particularly the I-605 due to shifting of the trucks to the I-710 with the introduction of the freight corridor. Once again as in the case of NO_x emissions there, emissions on CA-60 and the northern section of the I-710 are greater for these freight corridor build alternatives compared to the No Build Alternatives as the freight corridor ends and the trucks get onto the mainlines of these two freeways; however changes compared to the 2008 baseline show decreases in total and entrained $PM_{2.5}$ on the CA-60.

The criteria pollutant emissions for the I-710 freeway were also estimated using the post processed traffic data. These emissions were used to model the criteria pollutant concentration impacts of the I-710 freeway in the AOI as discussed in the subsequent section. The incremental criteria pollutant emissions from the I-710 freeway as compared to the 2008 baseline calculated using post processed traffic data (Table 4.4) were found to show similar trends as the incremental emissions calculated using the I-710 Traffic Model data (Table 4.3c).

[44] Vehicle PM exhaust emissions include brake and tire wear also.

Table 4.3a Incremental Criteria Pollutant Mass Emissions within the SCAB Compared to 2008 Baseline

Pollutant	Alt.1 vs. 2008		Alt 5A vs. 2008		Alt. 6A vs. 2008		Alt. 6B vs. 2008		Alt. 6C vs. 2008		SCAQMD CEQA Mass Emission Thresholds (lb/day)
	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change	
NO_x	-870,000	-84%	-870,000	-84%	-870,000	-84%	-880,000	-85%	-880,000	-85%	55
CO	-2,000,000	-70%	-2,000,000	-70%	-2,000,000	-70%	-2,000,000	-70%	-2,000,000	-70%	550
PM_{10} (Total)	23,000	15%	23,000	15%	24,000	15%	23,000	15%	23,000	15%	150
PM_{10} (Exhaust)	*-9,500*	*-16%*	*-9,400*	*-16%*	*-9,400*	*-16%*	*-9,800*	*-17%*	*-9,700*	*-16%*	-
PM_{10} (Entrained)	*33,000*	*34%*	*33,000*	*34%*	*33,000*	*34%*	*33,000*	*35%*	*33,000*	*34%*	-
$PM_{2.5}$ (Total)	-2,300	-3%	-2,300	-3%	-2,200	-3%	-2,500	-4%	-2,400	-4%	55
$PM_{2.5}$ (Exhaust)	*-10,000*	*-24%*	*-10,000*	*-24%*	*-10,000*	*-24%*	*-11,000*	*-24%*	*-11,000*	*-24%*	-
$PM_{2.5}$ (Entrained)	*8,100*	*34%*	*8,100*	*34%*	*8,100*	*34%*	*8,100*	*35%*	*8,100*	*34%*	-
ROG	-170,000	-70%	-160,000	-70%	-170,000	-70%	-170,000	-71%	-170,000	-71%	55
SO_2	1,300	33%	1,300	33%	1,300	33%	1,200	32%	1,300	32%	150

Notes:
For Alternative 6B and 6C, trucks have zero exhaust emissions while they are traveling on the freight corridor. Entrained dust (both PM_{10} and $PM_{2.5}$) emissions occur in all alternatives.
Emissions based on I-710 Traffic Model data.
Numbers are rounded to two significant digits.

Table 4.3b Incremental Criteria Pollutant Mass Emissions within the Area of Interest (AOI) Compared to 2008 Baseline

Pollutant	Alt.1 vs. 2008		Alt 5A vs. 2008		Alt. 6A vs. 2008		Alt. 6B vs. 2008		Alt. 6C vs. 2008	
	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change
NO_x	-200,000	-82%	-200,000	-82%	-200,000	-82%	-200,000	-84%	-200,000	-83%
CO	-510,000	-74%	-510,000	-74%	-510,000	-74%	-510,000	-74%	-510,000	-74%
PM_{10} (Total)	1,800	5%	1,900	5%	2,100	6%	1,800	5%	1,800	5%
PM_{10} (Exhaust)	*-3,400*	*-24%*	*-3,400*	*-24%*	*-3,300*	*-24%*	*-3,600*	*-26%*	*-3,600*	*-26%*
PM_{10} (Entrained)	*5,200*	*23%*	*5,300*	*23%*	*5,400*	*24%*	*5,500*	*24%*	*5,400*	*24%*
$PM_{2.5}$ (Total)	-2,000	-12%	-1,900	-12%	-1,900	-11%	-2,100	-13%	-2,100	-13%
$PM_{2.5}$ (Exhaust)	*-3,200*	*-31%*	*-3,200*	*-31%*	*-3,200*	*-30%*	*-3,400*	*-33%*	*-3,400*	*-32%*
$PM_{2.5}$ (Entrained)	*1,300*	*23%*	*1,300*	*23%*	*1,300*	*24%*	*1,300*	*24%*	*1,300*	*24%*
ROG	-43,000	-74%	-43,000	-74%	-44,000	-74%	-44,000	-75%	-44,000	-75%
SO_2	160	18%	160	18%	160	18%	140	15%	150	16%

Notes:
For Alternative 6B and 6C, trucks have zero exhaust emissions while they are traveling on the freight corridor. Entrained dust (both PM_{10} and $PM_{2.5}$) emissions occur in all alternatives.
Emissions based on I-710 Traffic Model data.
Numbers are rounded to two significant digits.

Table 4.3c Incremental Criteria Pollutant Mass Emissions for the I-710 Freeway Compared to 2008 Baseline

Pollutant	Alt.1 vs. 2008		Alt 5A vs. 2008		Alt. 6A vs. 2008		Alt. 6B vs. 2008		Alt. 6C vs. 2008	
	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change
NO_x	-13,000	-72%	-13,000	-70%	-11,000	-60%	-15,000	-83%	-14,000	-80%
CO	-19,000	-71%	-17,000	-66%	-16,000	-60%	-18,000	-69%	-18,000	-68%
PM_{10} (Total)	230	12%	580	31%	1,300	68%	1,000	54%	920	49%
PM_{10} (Exhaust)	*-300*	*-34%*	*-190*	*-22%*	*-10*	*-1%*	*-330*	*-39%*	*-290*	*-33%*
PM_{10} (Entrained)	*530*	*51%*	*770*	*75%*	*1,300*	*127%*	*1,400*	*132%*	*1,200*	*118%*
$PM_{2.5}$ (Total)	-170	-18%	-40	-4%	230	24%	0	0%	0	-1%
$PM_{2.5}$ (Exhaust)	*-300*	*-43%*	*-230*	*-33%*	*-90*	*-13%*	*-340*	*-49%*	*-300*	*-44%*
$PM_{2.5}$ (Entrained)	*130*	*51%*	*190*	*75%*	*320*	*127%*	*330*	*132%*	*300*	*118%*
ROG	-1,500	-69%	-1,500	-67%	-1,300	-60%	-1,600	-74%	-1,600	-73%
SO_2	15	38%	23	59%	36	93%	13	33%	15	40%

Notes:
For Alternative 6B and 6C, trucks have zero exhaust emissions while they are traveling on the freight corridor. Entrained dust (both PM_{10} and $PM_{2.5}$) emissions occur in all alternatives.
Emissions based on I-710 Traffic Model data.
Numbers are rounded to two significant digits. Emission changes of 1% or smaller are presented as zero emission changes.

Table 4.4 Incremental Criteria Pollutant Mass Emissions Compared to 2008 Baseline for the I-710 freeway (using Post-Processed Traffic Data)

Pollutant	Alt. 1 vs. 2008		Alt. 5A vs. 2008		Alt. 6A vs. 2008		Alt. 6B vs. 2008		Alt. 6C vs. 2008	
	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change
NO_x	-18,000	-73%	-17,000	-72%	-16,000	-65%	-20,000	-84%	-20,000	-82%
CO	-19,000	-71%	-17,000	-65%	-16,000	-59%	-18,000	-69%	-18,000	-68%
PM_{10} (Total)	120	5%	400	19%	1,100	48%	800	34%	680	29%
PM_{10} (Exhaust)	*-470*	*-43%*	*-360*	*-33%*	*-190*	*-17%*	*-540*	*-49%*	*-500*	*-45%*
PM_{10} (Entrained)	*590*	*48%*	*800*	*65%*	*1,300*	*106%*	*1,300*	*108%*	*1,200*	*95%*
$PM_{2.5}$ (Total)	-320	-26%	-190	-16%	70	5%	-190	-16%	-200	-17%
$PM_{2.5}$ (Exhaust)	*-460*	*-52%*	*-390*	*-43%*	*-260*	*-29%*	*-520*	*-58%*	*-490*	*-55%*
$PM_{2.5}$ (Entrained)	*150*	*48%*	*200*	*65%*	*320*	*106%*	*330*	*108%*	*290*	*95%*
ROG	-1,700	-69%	-1,700	-68%	-1,500	-60%	-1,800	-73%	-1,800	-73%
SO_2	17	40%	24	58%	37	89%	12	29%	14	34%

Notes:
For Alternative 6B and 6C, trucks have zero exhaust emissions while they are traveling on the freight corridor. Entrained dust (both PM_{10} and $PM_{2.5}$) emissions occur in all alternatives.
Emissions based on I-710 Traffic Model data, post-processed to incorporate traffic count information and detailed I-710 geometrics information.
Numbers are rounded to two significant digits

4.3.4 I-710 Near-Roadway Air Quality Impacts (modeled)

Emissions released from vehicles on the I-710 freeway are mixed and diluted in ambient air and ultimately transported away from the freeway. The simulation of the release and transport of emissions from the I-710 traffic in order to estimate the concentrations of the criteria pollutants at specified locations (called 'modeling grid points' and/or 'receptors')[45] is performed through air dispersion modeling.

IMPORTANT NOTE: Modeling of the quantities and effects of project traffic-related air pollution was performed using emissions data calculated only for the I-710 mainline and for certain alternatives, the freight corridor, using post-processed traffic data as described above. This was done because of several reasons, including 1) I-710 Traffic Model link data does not have information on all local roads (it is aggregated for certain origins and destinations) appropriate for near-roadway modeling, 2) post-processed data would not be available for other roadways, and 3) it was anticipated that the greatest impacts would be on the I-710 freeway and freight corridor because the project Build Alternatives would result in higher traffic levels/emissions on the I-710. The modeling results do not reflect changes in emissions on the other nearby freeways, local arterials and other local roadways. Based on the emissions analysis of the build alternatives, emissions of criteria pollutants generally decrease on these nearby freeways, arterials and roadways as traffic shifts to the I-710 as seen in Figures 4.2 through 4.6. ***The modeling results presented account for the impacts from increased traffic on the I-710 for the build alternatives but do not account for any decreases in ambient concentrations related to reduced traffic on nearby freeways, arterials, and roadways for the build alternatives as mobility improves on the I-710. In addition, the modeling assumes weekday traffic levels/patterns for every day of the year, including weekends and holidays. These assumptions are conservative and will generally yield a conservative estimate of incremental air quality and health impacts. These results should ONLY be used to compare the relative impacts of the alternatives.***

For this study, the USEPA's AERMOD dispersion model[46] was used to model the criteria pollutant concentrations that would result from traffic-related emissions on the I-710 freeway and for certain alternatives, the freight corridor. These analyses are consistent with the EPA's Guidance for Quantitative PM analyses with minor modifications. For example, freeway traffic emissions were represented in AERMOD as a series of volume sources, which is accepted practice for modeling mobile sources in a dispersion model (ENVIRON, 2006b,c,d,e,f,g, 2007a,b, 2008). Appropriately sized and positioned volume sources were placed along the I-710 Corridor using Geographic Information Systems (GIS) tools. Hourly-resolution meteorological surface data, such as wind speed and direction, and upper air data were also employed in the AERMOD analysis of pollutant transport and dispersion. A unique aspect of the project is that the I-710 freeway is 18 miles in length, and meteorological conditions vary based on the receptor location over that distance. Therefore, a "Sphere of Influence" approach was used and

[45] Receptors' in a modeling context can mean the model grid points where air quality and health risk are calculated. In a more general context, a 'receptor' can be a resident, worker, etc. 'Sensitive receptors' are schools, day care centers, senior centers, etc.

[46] http://www.epa.gov/scram001/dispersion_prefrec.htm

the I-710 Corridor was broken into four reasonably representative meteorological zones. Meteorological data for a station in each zone was processed using AERMET, the USEPA meteorological preprocessor program for AERMOD. More details on the air dispersion modeling using AERMOD are presented in Appendix D.

As guidance to lead agencies, the SCAQMD has established CEQA significance thresholds for concentration impacts for NO_2 (1-hr and annual average), CO (1-hr and 8-hr), PM_{10} (24-hr and annual average), and $PM_{2.5}$ (24-hr average). Caltrans, the CEQA Lead Agency for the I-710 Corridor Project, has not adopted the SCAQMD significance thresholds but has stated they will use them as part of their overall significance determinations. Therefore, the concentration impacts for only these criteria pollutants and corresponding averaging periods were calculated and reported.

Since the SCAB is in attainment/maintenance for both NO_2 and CO for the National Ambient Air Quality Standards, the incremental impacts are added to the background ambient air concentration. (Note that SCAQMD is in non-attainment for the California Ambient Air Quality Standards for NO_2). Since the project area is 18 miles long, a single background monitoring station cannot be used as a representative station for all the receptors in the modeling domain. Therefore, ENVIRON identified three different SCAQMD ambient air monitoring stations closer to the I-710 freeway that were used to determine the background concentrations. As stated earlier the project area has been divided into four meteorological zones; therefore a background ambient air monitor was selected for each meteorological zone. However, it should be noted that there are no SCAQMD monitoring stations in zone 1. Hence, data from the ambient air monitoring station for zone 2 was used to represent zone 1. Table 4.5 below presents the ambient air monitoring stations and the associated data for the years 2006 through 2008.

Table 4.5 Background Concentrations for NO_2 and CO

Station	Met Zone	Year	NO_2		CO		Maximum NO_2				Maximum CO			
			Max Conc. in 1-hour	Annual Avg. AAM Conc.	Max Conc. in 1-hour	Max Conc. in 8-hour	Max Conc. in 1-hour		Annual Avg. AAM Conc.		Max Conc. in 1-hour		Max Conc. in 8-hour	
			ppm	ppm	ppm	ppm	ppm	µg/m³	ppm	µg/m³	ppm	µg/m³	ppm	µg/m³
North Long Beach	1, 2*	2006	0.10	0.0215	4	3.4	0.13	244.6	0.0215	40.5	4	4582	3.4	3895
		2007	0.11	0.0207	3**	2.6**								
		2008	0.13	0.0208	3	2.6								
Lynwood	3	2006	0.14	0.0306	8	6.4	0.14	263.4	0.0306	57.6	8	9165	6.4	7332
		2007	0.10	0.0291	8	5.1								
		2008	0.12**	0.0301**	6**	4.3**								
Los Angeles - N. Main St.	4	2006	0.11	0.0288	3	2.6	0.12	225.8	0.0299	56.3	3	3437	2.6	2979
		2007	0.10	0.0299	3	2.2								
		2008	0.12	0.0275	3	2.1								

Notes:
AAM = Annual Arithmetic Mean.
Conc = Concentration
Max = Maximum
* The North Long Beach station has been used for meteorological zones 1 and 2, because there are no AQMD monitors located in meteorological zone 1
** Data points corresponding to less than 12 full months of data, and therefore may not be representative. These values have been excluded from the calculations of the maximums.

Tables 4.6a through 4.6e provide the calculated maximum incremental concentration impacts for the various alternatives as compared to the 2008 baseline for NO_2 and CO. Because the SCAB is designated an attainment area for these pollutants, ENVIRON calculated the maximum concentration impact; background plus increment concentration change was calculated for each modeling grid point and the maximum concentration in the modeling domain was chosen.

NOTE: The SCAQMD CEQA threshold levels[47] are presented for information only. Caltrans has not adopted these significance threshold levels, but has stated that it will use them as part of its significance determination.

Table 4.6a Incremental Concentration Impacts from I-710 Freeway Traffic for Alternative 1 as compared to 2008 Baseline

Pollutant	Averaging Time	Incremental Impact	Maximum (Incremental + Background) Concentration Impact	SCAQMD CEQA Threshold level	National Ambient Air Quality Standards
		(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
Nitrogen Dioxide (NO_2)	1-hour	-81.2	145	339	188
	Annual	-0.6	55.6	56.0	100
Carbon Monoxide (CO)	1-hour	-211	8,950	23,000	40,000
	8-hour	-36	7,300	10,000	10,000

Table 4.6b Incremental Concentration Impacts from I-710 Freeway Traffic for Alternative 5A as compared to 2008 Baseline

Pollutant	Averaging Time	Incremental Impact	Maximum (Incremental + Background) Concentration Impact	SCAQMD CEQA Threshold level	National Ambient Air Quality Standards
		(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
Nitrogen Dioxide (NO_2)	1-hour	-79.4	146	339	188
	Annual	-0.6	55.7	56.0	100
Carbon Monoxide (CO)	1-hour	-203	8,960	23,000	40,000
	8-hour	-34	7,300	10,000	10,000

[47] SCAQMD CEQA threshold levels are from SCAQMD Air Quality Significance Thresholds (revision March 2011) available at http://www.aqmd.gov/ceqa/handbook/signthres.pdf. National Ambient Air Quality Standards accessed at http://www.epa.gov/air/criteria.html, September 2011.

Table 4.6c Incremental Concentration Impacts from I-710 Freeway Traffic for Alternative 6A as compared to 2008 Baseline

Pollutant	Averaging Time	Incremental Impact (µg/m³)	Maximum (Incremental + Background) Concentration Impact (µg/m³)	SCAQMD CEQA Threshold Level (µg/m³)	National Ambient Air Quality Standards (µg/m³)
Nitrogen Dioxide (NO2)	1-hour	-70.1	156	339	188
	Annual	4.8	62.4	56.0	100
Carbon Monoxide (CO)	1-hour	-241	8,920	23,000	40,000
	8-hour	-37	7,300	10,000	10,000

Table 4.6d Incremental Concentration Impacts from I-710 Freeway Traffic for Alternative 6B as compared to 2008 Baseline

Pollutant	Averaging Time	Incremental Impact (µg/m³)	Maximum (Incremental + Background) Concentration Impact (µg/m³)	SCAQMD CEQA Threshold Level (µg/m³)	National Ambient Air Quality Standards (µg/m³)
Nitrogen Dioxide (NO_2)	1-hour	-84.5	141	339	188
	Annual	-0.7	55.6	56.0	100
Carbon Monoxide (CO)	1-hour	-254	8,910	23,000	40,000
	8-hour	-40	7,290	10,000	10,000

Table 4.6e Incremental Concentration Impacts from I-710 Freeway Traffic for Alternative 6C as compared to 2008 Baseline

Pollutant	Averaging Time	Incremental Impact (µg/m³)	Maximum (Incremental + Background) Concentration Impact (µg/m³)	SCAQMD CEQA Threshold Levels (µg/m³)	National Ambient Air Quality Standards (µg/m³)
Nitrogen Dioxide (NO_2)	1-hour	-83.9	142	339	188
	Annual	-0.7	55.6	56.0	100
Carbon Monoxide (CO)	1-hour	-254	8,910	23,000	40,000
	8-hour	-39	7,290	10,000	10,000

The CO and NO_2 incremental impacts decrease for all 2035 alternatives (except for Alternative 6A) as compared to the 2008 baseline. The 2035 ambient concentration levels calculated by adding the incremental impacts to existing background concentrations were found to be below the California Ambient Air Quality Standards (CAAQS) and the National Ambient Air

Quality Standards (NAAQS) for most alternatives. Only the calculated annual NO_2 ambient concentration for Alternative 6A exceeds the CAAQS level, and at only one receptor, which is ~10 meter from the center of the freight corridor. Factors/assumptions that contribute to the exceedance of the CAAQS at this receptor include 1) an annual average background concentration (57.6 $\mu g/m^3$) is greater than the CAAQS level (56 $\mu g/m^3$); 2) the analysis used a conservative assumption that all NO_x is converted to NO_2; and 3) ignoring the reductions in NO_x occurring due to reduced traffic on local roadways and nearby freeways, and 4) no one is expected to be exposed for a year that close to the freight corridor. Calculated maximum 1-hour NO_2 concentration levels (maximum of the sum of the current background plus modeled incremental concentration change) are well below the new 1-hour NO_2 standard level of 100 ppb (or 188$\mu g/m^3$) as reductions in vehicle emissions from adopted regulations and fleet turnover reduce emissions faster than the rate of increase in vehicle miles travelled. The large reductions in NO_2 concentrations in the 2035 alternatives are consistent with EPA[48] and SCAQMD projections of reductions in future NO_2 levels.

Because the SCAB is a non-attainment area for both PM_{10} and $PM_{2.5}$, the thresholds for PM_{10} and $PM_{2.5}$ are incremental (i.e., background levels are not added to incremental impacts). Tables 4.7a through 4.7e present the calculated maximum incremental concentration impacts for PM_{10} and $PM_{2.5}$ for the various alternatives as compared to the 2008 baseline.

NOTE: The SCAQMD CEQA threshold levels[49] are presented for information only. Caltrans has not adopted these significance threshold levels, but has stated that it will use them as part of its significance determination.

NOTE: All impacts greater than the SCAQMD Threshold level(s) are the result of entrained road dust emissions, which are calculated assuming that an infinite amount of dust is available on the roadways. Exhaust emissions do not result in impacts above this level, except at a few grid points next to freeway/freight corridor in Alternative 6A.

Table 4.7a Incremental Concentration Impacts from I-710 Freeway Traffic for Alternative 1 as compared to 2008 Baseline

Pollutant	Averaging Time	Maximum Incremental Impact ($\mu g/m^3$)	SCAQMD CEQA Threshold level ($\mu g/m^3$)
Total PM_{10}	24-hour	19.6*	2.5
	Annual	13.9*	1.0
Total $PM_{2.5}$	24-hour	0.036	2.5

*Impacts above the SCAQMD's threshold levels are in areas close (300 meters or less) to the mainline and/or freight corridor. Maximum impacts occur within 50 meters.

48 EPA. Final Regulatory Impact Analysis (RIA) for the NO_2 National Ambient Air Quality Standards (NAAQS). January 2010. See www.epa.gov/ttn/ecas/regdata/RIAs/FinalNO2RIAfulldocument.pdf

49 SCAQMD CEQA threshold levels are from SCAQMD Air Quality Significance Thresholds (revision March 2011) available at www.aqmd.gov/ceqa/handbook/signthres.pdf. National Ambient Air Quality Standards accessed at www.epa.gov/air/criteria.html, September 2011.

Table 4.7b Incremental Concentration Impacts from I-710 Freeway Traffic for Alternative 5A as compared to 2008 Baseline

Pollutant	Averaging Time	Maximum Incremental Impact ($\mu g/m^3$)	SCAQMD CEQA Threshold level ($\mu g/m^3$)
Total PM_{10}	24-hour	60.5*	2.5
	Annual	35.6*	1.0
Total $PM_{2.5}$	24-hour	15.5*	2.5

*Impacts above the SCAQMD's threshold levels are in areas close (300 meters or less) to the mainline and/or freight corridor. Maximum impacts occur within 50 meters.

Table 4.7c Incremental Concentration Impacts from I-710 Freeway Traffic for Alternative 6A as compared to 2008 Baseline

Pollutant	Averaging Time	Maximum Incremental Impact ($\mu g/m^3$)	SCAQMD CEQA Threshold level ($\mu g/m^3$)
Total PM_{10}	24-hour	78.7*	2.5
	Annual	44.4*	1.0
Total $PM_{2.5}$	24-hour	21.0*	2.5

*Impacts above the SCAQMD's threshold levels are in areas close (300 meters or less) to the mainline and/or freight corridor. Maximum impacts occur within 50 meters.

Table 4.7d Incremental Concentration Impacts from I-710 Freeway Traffic for Alternative 6B as compared to 2008 Baseline

Pollutant	Averaging Time	Maximum Incremental Impact ($\mu g/m^3$)	SCAQMD CEQA Threshold level ($\mu g/m^3$)
Total PM_{10}	24-hour	74.4*	2.5
	Annual	42.5*	1.0
Total $PM_{2.5}$	24-hour	15.3*	2.5

*Impacts above the SCAQMD's threshold levels are in areas close (300 meters or less) to the mainline and/or freight corridor. Maximum impacts occur within 50 meters.

Table 4.7e Incremental Concentration Impacts from I-710 Freeway Traffic for Alternative 6C as compared to 2008 Baseline

Pollutant	Averaging Time	Maximum Incremental Impact ($\mu g/m^3$)	SCAQMD CEQA Threshold level ($\mu g/m^3$)
Total PM_{10}	24-hour	64.2*	2.5
	Annual	34.9*	1.0
Total $PM_{2.5}$	24-hour	13.1*	2.5

*Impacts above the SCAQMD's threshold levels are in areas close (300 meters or less) to the mainline and/or freight corridor. Maximum impacts occur within 50 meters.

Figures 4.12 through 4.16, Figures 4.17 through 4.21 and Figures 4.22 through 4.26 show annual PM_{10} isopleths, 24-hr PM_{10} "bubble" plots[50] and 24-hr $PM_{2.5}$ "bubble" plots respectively for the comparison of 2035 alternatives to 2008 baseline. Each of these figures show plots for both exhaust and total PM impacts. The bubble plots present the maximum incremental 24-hr concentration at each modeling grid points over the entire year (i.e. increments on other days would be smaller or more negative). Please note that the maximum incremental 24-hr concentration at one modeling point may not occur on the same day as the maximum incremental 24-hr concentration on another modeling point. All the build alternatives show an increase in the total PM_{10} and total $PM_{2.5}$ impacts as compared to 2008 baseline that are greater than the SCAQMD incremental thresholds at several receptors. It should however be noted that the total PM mass emissions were calculated as a sum of the exhaust and entrained dust emissions. ENVIRON used EPA's AP-42 methodology to estimate the entrained dust emissions, which assumes an infinite volume of silt reservoir. As discussed previously, the SCAQMD 2007 AQMP approach would show no increases due to VMT increases (finite silt reservoir). Therefore, the number of modeling points above the SCAQMD threshold would decrease if a more realistic finite silt reservoir were assumed. A look at the incremental impact isopleths and bubble plots for exhaust PM-only impacts are below the SCAQMD's significance threshold for almost all modeling grid points, the exception being some modeling grid points in very close proximity to the I-710 freeway or freight corridor.

All the build alternatives show an increase in near-roadway impacts compared to the No-Build Alternative. This occurs due to the increased mobility and capacity of the I-710 freeway in the build alternatives as compared to the No Build Alternative, which in turn results in more traffic and greater mass emissions. Alternatives 6B and 6C show the minimum increase (compared to 2035 No-Build) in impacts amongst the build alternatives because the freight corridor is a zero emissions roadway. Figures 4.27 through 4.30, Figures 4.31 through 4.34 and Figures 4.35 through 4.38 show annual PM_{10} isopleths, 24-hr PM_{10} bubble plots and 24-hr $PM_{2.5}$ bubble plots respectively for the comparison of build alternatives to the No Build alternative. These figures show a side by side comparison of the calculated impacts for exhaust PM and total PM. As in the case of the comparison to the 2008 baseline, the number of modeling grid points above the SCAQMD significance threshold for exhaust PM is lower than the modeling grid points above SCAQMD significance threshold for total PM.

4.3.5 MSAT Analyses

MSAT Emissions

Toxic air contaminants (TACs) emissions are components of total organic gas (TOG) emissions (gas-phase TACs) and PM_{10}/$PM_{2.5}$ emissions (particle-phase TACs), which are both quantified using EMFAC as described above. Emissions of individual TACs were calculated by applying speciation profiles from the CARB speciation database[51] to total TOG and PM_{10}/$PM_{2.5}$ emissions. See Section 2.3 for a discussion of how the six priority MSAT were determined for this analysis. In summary, the six priority MSAT analyzed in the I-710 AQ/HRA are:

[50] The "bubble" plots are a new way of presenting maximum incremental changes in 24-hour PM_{10} and $PM_{2.5}$ concentrations. See text for more information.
[51] Available at http://www.arb.ca.gov/ei/speciate/speciate.htm.

- Diesel exhaust (particulate matter and organic gases)
- Benzene
- 1,3-Butadiene
- Acetaldehyde
- Formaldehyde
- Acrolein

Tables 4.8a through 4.8c present the incremental MSAT emission calculations using the I-710 Traffic model data for the various alternatives as compared to 2008 baseline. Emissions of all 6 MSAT decrease for all 2035 alternatives compared to the 2008 baseline, despite increases in VMT in 2035. Figures 4.39 through 4.43 present the change in Diesel Particulate Matter (DPM) emissions for build alternatives as compared to the 2008 baseline and the No Build Alternative. These gridded emission figures have been plotted by adding the DPM emissions from links or part of links present in a grid size of 0.25 miles by 0.25 miles. The DPM emissions for the build alternatives compared to 2008 baseline generally decrease on the freeways, arterials and roadways in the AOI in spite of the VMT increases. This happens because of improvement in vehicle technology that occur due to implementation of state and local programs/regulations.

A comparison of the build alternatives to the No Build Alternative shows decreases in emissions on CA-91, I-605, I-110, I-105 and I-5. This is due to the shifting of trucks to the I-710 freeway, which has greater capacity and mobility than in the No Build Alternative. The build alternatives also show an increase in the DPM emissions on I-405, CA-60, I-10 and the north end of I-710. The increase in I-405 can be attributed to the movement of trucks from the I-405 onto the I-710. Increases in emissions on the north end of I-710, including CA-60 and I-5, occur when the trucks on I-710 get off the freeway. For Alternative 5A and Alternative 6A, comparisons to the No Build Alternative the DPM emissions on I-710 increase due to larger number of trucks on this freeway. This increase in DPM emissions is more prominent than the increases seen in NO_x emissions (Figures 4.2 to 4.6) for the same scenario. This can be attributed to nature of the emissions factor versus speed curve. The 2035 DPM emission factors, although small, progressively increase for average speeds above 20 mph (Figure C.1 of Appendix C). The 2035 NO_x emissions factors however decrease dramatically between 5 mph and 50 mph and then increase slightly at speeds greater than 50mph. This unique behavior of the DPM emission factor results in the relatively larger emission increases seen on the I-710 freeway for Alternative 5A and Alternative 6A. These increases in DPM emissions on the I-710 freeway are not found for the comparisons of Alternative 6B and Alternative 6C to the No Build Alternative because these alternatives have zero-emission freight corridors.

The MSAT emissions were also calculated for the I-710 using the post processed traffic data. The incremental MSAT emissions for the I-710 freeway calculated using post processed traffic data shown in Table 4.9 were found to be similar to emissions calculated using the I-170 Traffic Model data (Table 4.8c). MSAT emissions calculated from post processed traffic data were used to conduct MSAT health risk assessment as discussed in Section 4.3.6.

Table 4.8a Incremental MSAT Emissions within the SCAB Compared to 2008 Baseline

Mobile Source Air Toxic	Alt.1 vs. 2008		Alt 5A vs. 2008		Alt. 6A vs. 2008		Alt. 6B vs. 2008		Alt. 6C vs. 2008	
	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change
DPM	-23,000	-78%	-23,000	-78%	-23,000	-77%	-23,000	-78%	-23,000	-78%
Benzene	-3,000	-87%	-3,000	-87%	-3,000	-87%	-3,000	-87%	-3,000	-87%
Acetaldehyde	-600	-92%	-600	-92%	-600	-92%	-600	-92%	-600	-92%
Formaldehyde	-2,300	-89%	-2,300	-89%	-2,300	-89%	-2,300	-89%	-2,300	-89%
1,3- butadiene	-700	-88%	-700	-88%	-700	-88%	-700	-88%	-700	-88%
Acrolein	-160	-87%	-160	-87%	-160	-87%	-160	-87%	-160	-87%

Notes:
For Alternative 6B and 6C, trucks have zero exhaust emissions while they are traveling on the freight corridor. Emissions based on I-710 Traffic Model data. Numbers are rounded to two significant digits.

Table 4.8b Incremental MSAT Emissions within the Area of Interest (AOI) Compared to 2008 Baseline

Mobile Source Air Toxic	Alt.1 vs. 2008		Alt 5A vs. 2008		Alt. 6A vs. 2008		Alt. 6B vs. 2008		Alt. 6C vs. 2008	
	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change
DPM	-5,500	-79%	-5,400	-79%	-5,400	-77%	-5,600	-81%	-5,600	-80%
Benzene	-760	-89%	-760	-89%	-760	-89%	-760	-89%	-760	-89%
Acetaldehyde	-150	-93%	-150	-93%	-150	-93%	-150	-93%	-150	-93%
Formaldehyde	-580	-90%	-580	-90%	-580	-90%	-580	-90%	-580	-90%
1,3- butadiene	-180	-89%	-180	-89%	-180	-89%	-180	-89%	-180	-89%
Acrolein	-41	-89%	-41	-89%	-41	-89%	-41	-89%	-41	-89%

Notes:
For Alternative 6B and 6C, trucks have zero exhaust emissions while they are traveling on the freight corridor. Emissions based on I-710 Traffic Model data. Numbers are rounded to two significant digits.

Table 4.8c Incremental MSAT Emissions on the I-710 Freeway Compared to 2008 Baseline

Mobile Source Air Toxic	Alt.1 vs. 2008		Alt 5A vs. 2008		Alt. 6A vs. 2008		Alt. 6B vs. 2008		Alt. 6C vs. 2008	
	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change
DPM	-390	-65%	-350	-57%	-230	-38%	-460	-76%	-430	-71%
Benzene	-22	-90%	-21	-88%	-21	-87%	-21	-87%	-21	-87%
Acetaldehyde	-5	-94%	-4	-93%	-4	-93%	-4	-93%	-4	-93%
Formaldehyde	-17	-91%	-16	-90%	-16	-89%	-16	-89%	-16	-89%
1,3- butadiene	-5	-90%	-5	-89%	-5	-88%	-5	-88%	-5	-88%
Acrolein	-1	-90%	-1	-88%	-1	-87%	-1	-87%	-1	-87%

Notes:
For Alternative 6B and 6C, trucks have zero exhaust emissions while they are traveling on the freight corridor. Emissions based on I-710 Traffic Model data.

Table 4.9 Incremental MSAT Emissions on the I-710 Freeway Compared to 2008 Baseline (post-processed traffic data)

Mobile Source Air Toxic	Alt.1 vs. 2008		Alt 5A vs. 2008		Alt. 6A vs. 2008		Alt. 6B vs. 2008		Alt. 6C vs. 2008	
	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change	lb/day	% Change
DPM	-570	-68%	-530	-63%	-410	-49%	-660	-79%	-630	-75%
Benzene	-19	-89%	-19	-87%	-18	-87%	-18	-87%	-18	-87%
Acetaldehyde	-4	-94%	-4	-93%	-4	-92%	-4	-92%	-4	-92%
Formaldehyde	-15	-91%	-14	-89%	-14	-89%	-14	-89%	-14	-89%
1,3- butadiene	-4	-90%	-4	-88%	-4	-87%	-4	-87%	-4	-87%
Acrolein	-1	-89%	-1	-87%	-1	-87%	-1	-87%	-1	-87%

Notes:
For Alternative 6B and 6C, trucks have zero exhaust emissions while they are traveling on the freight corridor. Emissions based on I-710 Traffic Model data, post-processed to incorporate traffic count information and detailed I-710 geometrics information.

4.3.6 MSAT Health Risk Assessment

The next step in the MSAT analysis was to calculate the health risks associated with the emissions of the MSAT near the I-710 freeway (where the greatest impacts would be expected). The health risk assessment (HRA) for the Project was conducted using a methodology that is consistent with Office of Environmental Health Hazard Assessment (OEHHA)[52] Air Toxics Hot Spots Program Risk Assessment Guidelines and SCAQMD Rule 1401/212 risk assessment guidance.[53] The ambient air concentrations of the various MSAT were calculated using the methodology used for calculating the concentrations of criteria pollutants as discussed in Section 4.3.4 above. The most recent toxicity values (cancer potency slope factor, chronic reference exposure level and acute reference exposure level) as published by OEHHA were used in the HRA. The HRA was a multi-pathway risk assessment, which means that all the applicable pathways for a particular MSAT were evaluated while calculating the health risks. Calculated health metrics are incremental cancer risk (in number per million), incremental hazard index (chronic and acute, unitless), and cancer burden. Appendix E presents more details on the HRA.

IMPORTANT NOTE: Similar to the criteria pollutant impacts modeling, the MSAT results do not reflect changes in emissions on the other nearby freeways, local arterials, and local roadways. Based on the emission analysis of the Build Alternatives, emissions of criteria pollutants (including TOG and PM) generally decrease on these nearby freeways, arterials, and roadways as traffic shifts to the I-710. Since MSAT are components of TOG and PM, emissions of MSAT are expected to follow a similar trend. ***The modeling results presented are conservative in that they account for impacts from increased traffic on the I-710 for the Build Alternatives but do not account for any decreases in ambient MSAT concentrations related to reduced traffic on nearby freeways, arterials, and roadways for the Build Alternatives as mobility improves on the I-710 and traffic decreases on these other roadways. All analyses assume weekday traffic levels/patterns for every day of the year, including weekends and holidays. All incremental cancer risk calculations are based on residential cancer risk assumptions, including 70-year ambient outdoor exposure (24/7/365). (Worker cancer risk is generally lower, since it assumes only work shift exposure for 40 years.) All of these assumptions will exaggerate the impacts of the project alternatives, yielding a conservative estimate of health impacts. These results should ONLY be used to compare the relative impacts of the alternatives.***

Tables 4.10a through 4.10e present the incremental health risk impacts for the various alternatives as compared to the 2008 baseline. All the alternatives (except Alternative 6A) show a decrease in cancer risk as compared to the 2008 baseline non-residential modeling grid points. This is further evidenced in Figures 4.44 to 4.48 that present the cancer risk isopleths. The increase in cancer risk for Alternative 6A is above the SCAQMD CEQA threshold at a few receptors (15 modeling grid points). These modeling grid points do not lie in residential areas

[52] Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003.
[53] South Coast Air Quality Management District, Risk Assessment Procedures for Rules 1401 and 212. Version 7.0. July 2005.

and are mostly located near the freight corridor or near industrial areas at the end of the freight corridor (Figure 4.46). Chronic hazard index and acute hazard index decrease for all 2035 alternatives (except Alternative 6A and Alternative 6B) as shown in Tables 4.10a through 4.10e. The increases in chronic and acute hazard indices seen for Alternative 6A and Alternative 6B are below the SCAQMD CEQA thresholds. The incremental cancer risk, chronic hazard index, and the acute hazard index for the all 2035 alternatives (including Alternative 6A) as compared to 2008 baseline decrease at all sensitive receptors (e.g., schools, daycare centers, senior centers, etc.) located within 5km of the centerline of I-710 freeway.

Table 4.10a Maximum Health Impacts Associated With MSAT Emissions from I-710 Freeway Traffic for Alternative 1 Compared to 2008

Health Impact	Receptor Type/Exposure Scenario	Maximum Incremental Risk Impact from Project Emissions (Risk in 1 million)	SCAQMD Threshold (Risk in 1 million)
Cancer risk	Residential	-6	10
Health Impact	**Receptor Type/Exposure Scenario**	**Maximum Incremental Risk Impact from Project Emissions (Hazard Index)**	**SCAQMD Threshold (Hazard Index)**
Chronic Noncancer Hazard Index	Residential	-0.004	1.0
Acute Noncancer Hazard Index	Residential	-0.017	1.0

Note:
See assumptions and limitations described in the text IMPORTANT NOTE above.
To be conservative, health risk impacts were estimated based on the residential exposure scenario.

Table 4.10b Maximum Health Impacts Associated With MSAT Emissions from I-710 Freeway Traffic for Alternative 5A Compared to 2008

Health Impact	Receptor Type/Exposure Scenario	Maximum Incremental Risk Impact from Project Emissions (Risk in 1 million)	SCAQMD Threshold (Risk in 1 million)
Cancer risk	Residential	-6	10
Health Impact	**Receptor Type/Exposure Scenario**	**Maximum Incremental Risk Impact from Project Emissions (Hazard Index)**	**SCAQMD Threshold (Hazard Index)**
Chronic Noncancer Hazard Index	Residential	-0.004	1.0
Acute Noncancer Hazard Index	Residential	-0.016	1.0

Note:
See assumptions and limitations described in the text IMPORTANT NOTE above.
To be conservative, health risk impacts were estimated based on the residential exposure scenario.

Table 4.10c Maximum Health Impacts Associated With MSAT Emissions from I-710 Freeway Traffic for Alternative 6A Compared to 2008

Health Impact	Receptor Type/Exposure Scenario	Maximum Incremental Risk Impact from Project Emissions (Risk in 1 million)	SCAQMD Threshold (Risk in 1 million)
Cancer risk	Residential	462*	10
Health Impact	**Receptor Type/Exposure Scenario**	**Maximum Incremental Risk Impact from Project Emissions (Hazard Index)**	**SCAQMD Threshold (Hazard Index)**
Chronic Noncancer Hazard Index	Residential	0.279	1.0
Acute Noncancer Hazard Index	Residential	0.079	1.0

Notes:
See assumptions and limitations described in the text IMPORTANT NOTE above.
To be conservative, health risk impacts were estimated based on the residential exposure scenario.
* Only 15 grid points show incremental increases above 10 in a million. These grid points are **NOT** in residential areas and are generally located very near the freight corridor. The incremental cancer risk and incremental hazard indices decreased at all sensitive receptors in the modeling domain.

Table 4.10d Maximum Health Impacts Associated With MSAT Emissions from I-710 Freeway Traffic for Alternative 6B Compared to 2008

Health Impact	Receptor Type/Exposure Scenario	Maximum Incremental Risk Impact from Project Emissions (Risk in 1 million)	SCAQMD Threshold (Risk in 1 million)
Cancer risk	Residential	-7	10
Health Impact	**Receptor Type/Exposure Scenario**	**Maximum Incremental Risk Impact from Project Emissions (Hazard Index)**	**SCAQMD Threshold (Hazard Index)**
Chronic Noncancer Hazard Index	Residential	-0.005	1.0
Acute Noncancer Hazard Index	Residential	0.102	1.0

Note:
See assumptions and limitations described in the text IMPORTANT NOTE above.
To be conservative, health risk impacts were estimated based on the residential exposure scenario.

Table 4.10e Maximum Health Impacts Associated With MSAT Emissions from I-710 Freeway Traffic for Alternative 6C Compared to 2008

Health Impact	Receptor Type/Exposure Scenario	Maximum Incremental Risk Impact from Project Emissions (Risk in 1 million)	SCAQMD Threshold (Risk in 1 million)
Cancer risk	Residential	-7	10
Health Impact	**Receptor Type/Exposure Scenario**	**Maximum Incremental Risk Impact from Project Emissions (Hazard Index)**	**SCAQMD Threshold (Hazard Index)**
Chronic Noncancer Hazard Index	Residential	-0.005	1.0
Acute Noncancer Hazard Index	Residential	-0.0001	1.0

Note:
See assumptions and limitations described in the text IMPORTANT NOTE above.
To be conservative, health risk impacts were estimated based on the residential exposure scenario.

Figures 4.45 through 4.48 present the incremental cancer risk isopleths for the build alternatives as compared to the No Build Alternative. At grid receptors close to the I-710 (mainline and/or freight corridor), the build alternatives show an increase in maximum incremental cancer risk, chronic hazard index and acute hazard index when compared to the No Build Alternative. This occurs because of two factors

- Total I-710 mass emissions in 2035 are lower than that in 2008 due to improved vehicle technology and implementation of state and local programs/regulations. As a result, the mass emissions for the No Build Alternative, which is used as the baseline for this comparison, is low.
- Increased mobility and capacity on I-710 freeway for the build alternatives results greater VMTs and traffic speeds that translate to an increase in DPM emissions on the I-710 when compared to the No Build Alternative. DPM is one of the key pollutants used for the health risk assessment. As mentioned Section 4.3.5.1 the DPM emission factor versus average vehicle speed curve is unique and differs from other pollutants. 2035 DPM emission factors increase progressively for speeds above 20 to 25 mph. So the increased mobility on the I-710, which leads to higher speeds, contributes significantly to the higher DPM emissions on the I-710 freeway for the build alternatives as compared to the No Build Alternative.

4.4 Greenhouse Gas Emissions

A combination of the methodologies provided in the California Climate Action Registry's General Reporting Protocol (CCAR GRP), version 3.0 (CCAR 2008) and fuel consumption/efficiency data obtained from EMFAC 2007 and OFFROAD 2007 models, was used to calculate the GHG emissions associated with the Project. It should be noted that the GHG emissions were quantified only for the SCAB region given the global effect of GHG emissions and the limits of the applicable traffic modeling results.

The total GHG emissions from the project were reported in carbon dioxide equivalents (CO_2e). CO_2e is universal unit of measurement to indicate the global warming potential (GWP) of each of the six greenhouse gases, expressed in terms of the GWP of one unit of carbon dioxide. It is used to evaluate the impact of different greenhouse gases on a common basis. Emissions of each GHG were converted to CO_2e by multiplying the methane (CH_4) and N_2O emissions with the respective GWP. Additional details on the methodology and detailed emission calculation tables can be found in Appendix F. NOTE: The incremental GHG emissions for the 2035 alternatives as compared to 2008 baseline are all ~22,000,000 tonnes CO_2e/year. Our analysis does not include the effect of the Pavely Standard or other adopted state GHG reduction regulations. These would reduce 2035 GHG emissions for all alternatives. To focus on the impact of the Project Build alternatives, Table 4.11 below summarizes the results of the traffic-related GHG emissions compared to the No Build Alternative. Note that Alternative 6B reduces GHG emissions by over a half million tons/year in 2035.

Table 4.11 Incremental GHG Emissions using The I-710 Traffic Model Data as Compared to No Build Alternative for SCAB

Greenhouse Gas	Alt. 5A - Alt. 1	Alt. 6A - Alt. 1	Alt. 6B - Alt. 1	Alt. 6C - Alt. 1
	tonnes/year	tonnes/year	tonnes/year	tonnes/year
CH_4	0.016	0.028	0.026	0.028
N_2O	1.1	1.9	1.8	1.9
CO_2	300	-120,000	-600,000	-490,000
Total (CO_2 eq)	670	-120,000	-600,000	-490,000

4.5 PM Mortality and Morbidity

Respirable particulate matter (RPM) is a public health concern as it is known to impact both the respiratory and cardiovascular systems. RPM deposition in the lungs and penetration into the bloodstream (for the smallest particles) triggers a range of inflammation responses and exacerbates health problems such as asthma and chronic bronchitis. Individuals susceptible to higher health risks from exposure to airborne PM include children, the elderly, smokers, and people of all ages with low pulmonary/cardiovascular function. Information about the biological mechanisms by which exposure to ambient particles adversely affects the respiratory and cardiovascular systems may be found in an ARB 2002 review (ARB 2002b).

Numerous published epidemiological reports substantiate a correlation between the inhalation of ambient PM and increased cases of mortality/morbidity from heart and/or lung diseases. OEHHA is in the process of developing guidance on assessing health impacts from PM exposure. In recent studies (ARB 2002b, 2006h and 2006i, 2009), ARB reviewed and summarized the non-toxic health effects (i.e., mortality and morbidity) of PM exposure and presented a health effect model attempting to quantify these impacts based on concentration-response functions.[54] This ARB model has been used, for example, to estimate

[54] That is, concentration-response functions are used to predict the effect of changes in ambient PM concentrations on health effects such as premature deaths, cardiac and respiratory hospitalizations, asthma and other lower
Footnote continues on next page…

the number of cases of disease and premature deaths linked to PM and ozone exposure from ports and goods movement activity in California (ARB 2006h).

Although the ARB model has also been used to quantitatively assess project-specific incremental levels of public mortality and morbidity (see for example Chapter 3.2 of the POLB Middle Harbor Redevelopment Project, POLB 2009), such calculations are subject to significant uncertainty. Sources of uncertainty include emission estimates, population exposure estimates, concentration-response functions,[55] baseline rates of mortality and morbidity that are entered into concentration response functions, and occurrence of additional not-quantified adverse health effects. It should be noted that the nature of PM as a complex mixture of various pollutants, as well as the confounding health effects of pollutants such as SO_2, NO_2, CO, and O_3 that tend to co-occur with PM in ambient air, greatly increase the complexity of deriving accurate PM concentration-response functions. Health risk estimates derived in the presence of significant uncertainty tend to rely on very conservative assumptions that may greatly overestimate the potential adverse health effects. As stated by ARB in a 2006 study of DPM exposure from ports and goods movement in California (ARB 2006a): "Risk assessment has various uncertainties in the methodology and is therefore deliberately designed so that risks are not under predicted. Risk assessment is thus best understood as a tool for comparing risks from various sources, usually for purposes of prioritizing risk reduction, and not as literal prediction of the community incidence of disease from exposure"[56].

In light of the uncertainty in quantifying PM mortality and morbidity (particularly for a freeway project such as the I-710), our analysis of PM mortality and morbidity is a qualitative assessment based on comparative analysis of total $PM_{2.5}$ emissions for the various alternatives. In other words, for the purpose of this qualitative assessment, total $PM_{2.5}$ emissions are used as a potential surrogate for PM exposure. Calculations show that, in general, total I-710 $PM_{2.5}$ emissions (sum of exhaust and entrained road dust emissions) are expected to be lower for each of 2035 Alternatives (1, 5A, 6A, 6B and 6C) than 2008 baseline emissions (except for some quarter-mile areas along the I-710 freeway itself); the same is true for total $PM_{2.5}$ emissions within the SCAB. Consequently, the public's exposure within the Area of Interest to PM-related morbidity and mortality health risks should decrease relative to the 2008 baseline, with the greatest risk reductions in 2035 Alternatives 6B and 6C. As seen in Figures 4.22 through 4.26 (maximum 24-hour average) and Figures 4.49 through 4.53 (annual average), incremental total $PM_{2.5}$ concentration impacts from the I-710 freeway (and freight corridor, if applicable) for all of the 2035 alternatives compared to 2008 impacts are below the SCAQMD's significance threshold levels; the exception is there are areas next to the freight corridor (model grids less than about 50 meters from the corridor) with increases above the SCAQMD's significance threshold levels. As can be seen in those figures, these very near-roadway

respiratory symptoms, lost work/school days, etc.

[55] Concentration-response functions may be location-specific, since the composition of particulate matter varies significantly by region, and not all types of particulate matter are expected to have the same health effects. Therefore, the application of concentration-response functions obtained from epidemiologic studies conducted e.g. outside of California may introduce significant errors in estimating impacts in the South Coast Air Basin.

[56] Additional discussion and explanation of the sources and level of uncertainty in health risk assessments are provided by OEHHA in a 2003 report (OEHHA 2003).

increases are solely because of increases in entrained roadway dust from the 2008 baseline. If those increases in roadway dust are an artifact, then the impacts would be more similar to those shown in the exhaust $PM_{2.5}$ figures. Figures 4.35 through 4.38 (maximum 24-hour average) and Figures 4.54 through 4.57 (annual average) show that I-710 near-roadway total $PM_{2.5}$ concentrations compared to the 2035 Alternative 1 (No-Build Alternative) were about the same for Alternative 5A, were lower than Alternatives 6A, 6B and 6C, with Alternative 6A having greater near-roadway concentrations than the other alternatives compared to Alternative 1. Similar to the comparisons to the 2008 baseline, the appreciable adverse impacts occurred along the roadways (< 100 meters) and almost all were due to increases in entrained road dust. The near-roadway modeling confirms the conclusion of the emissions analyses for the Area of Interest: the exposure of people along the I-710 freeway to PM-related morbidity and mortality health risks should decrease relative to the 2008 baseline with the exception of some locations near the roadways (particularly for Alternative 6A). To the extent that increases in entrained road dust in the 2035 alternatives may be overestimated, the exposure would be even lower for those very near to the roadways (see discussion of ultrafine particulates below, which uses exhaust $PM_{2.5}$ (rather than total $PM_{2.5}$) as a surrogate).

4.6 Ultrafine Particulates – Qualitative Analysis

As scientific studies and environmental regulations are expanding, their focus on the smaller particles in ambient air (total suspended particulate to PM_{10} to $PM_{2.5}$) has grown. An increasing interest in particles of size < 0.1 microns, referred to as ultrafine particulate matter or ultrafine particulates (UFP or UFPs) is also developing. Although UFPs generally contribute to a small mass fraction of ambient PM, they are orders of magnitude more numerous than PM_{10} and $PM_{2.5}$ particles. Their number concentrations range from 10 to 40×10^3 UFPs/cm^3 in urban air and 40 to 1000 $\times 10^3$ UFPs/cm^3 near highways. UFPs are not currently regulated in the U.S. However, the SCAQMD recommended in its 2007 Air Quality Management Plan (2007 AQMP) that UFP be specifically addressed in PM and air toxics control strategies.

Fuel combustion in motor vehicles is a major source of UFP, and consequently UFP emissions are concentrated near highways and other roadways. Studies have shown that UFP number concentrations decrease sharply with distance from emission sources as a result of particle growth and accumulation processes; for instance Zhu et al. (Zhu 2002) reported that UFP concentration measurements were equal to background concentrations 300 meters downwind of Interstate 405 near the Los Angeles National Cemetery. Thus, high ambient UFP levels are very localized and exhibit large geographical and temporal variations. Concerns about public exposure to UFP (especially in areas near freeways) are due to the fact that UFPs and the contaminants they contain are relatively easily transported into the body. This is because (i) smaller particles can be inhaled and deposited deeper into the lungs than larger particles, and (ii) the high surface area/mass ratio of UFPs can facilitate adsorption and result in higher content of trace metals and other toxic organic compounds.

There has been increasing interest among the scientific community in roadway impacts to air quality specific to I-710 (Kozawa et al, 2009, Arhami et al 2009, Moore et al 2009). SCAQMD also conducted a series of near roadway ambient air monitoring studies, which examined traffic impacts on concentrations of a host of pollutants, including UFP.[57] [58] On February 18, 2010, AQMD reported preliminary findings of a study conducted along I-710. AQMD collected ambient air samples along I-710 in two one-month intensive campaigns (February-March 2009 and July-August 2009). Samples were collected from one background location upwind of the freeway and two locations downwind of the freeway at 15m and 80 m. Air pollutant species measured included UFP count, black carbon (BC), PM_{10}, $PM_{2.5}$, NOx, CO, TSP lead and VOC. Preliminary results indicate that ambient air near I-710 (15m) was enriched in UFP. Similar to the results published by Zhu et al, UFP was significantly higher at the monitoring site closest (15m) to the roadway and dropped off with distance (80 m). Both downwind monitoring sites were significantly higher than the upwind background measurement site. There was no significant difference in UFP count during winter vs. summer.

Information on UFP is limited at this time and is an area of active research. For example, physical transient behaviors such as particle growth and accumulation complicate the task of elucidating UFP concentration-response functions. Also, the existing state of knowledge does not yet support the derivation of reliable UFP emission models that account for the particulate growth and accumulation phases. Dispersion modeling of UFPs would also require additional information on the rate of UFP coagulation and absorption so that concentrations can be calculated. Given the lack of information to quantify emissions, dispersion, exposure, and health response to exposure, we could not quantify UFP emissions from the proposed project. However, we have conducted a qualitative analysis by using $PM_{2.5}$ exhaust emissions, and exposure as a surrogate for UFP exposure.[59] The I-710 $PM_{2.5}$ exhaust emissions in 2035 are expected to be lower for each of Alternatives 1, 5A, 6A, 6B and 6C compared to the 2008 baseline emissions; the same is true for $PM_{2.5}$ exhaust emissions within the SCAB. Consequently, we expect that the public's exposure to UFP in 2035 would decrease relative to the 2008 baseline. In addition, because I-710 freeway (mainline and freight corridor) $PM_{2.5}$ exhaust emissions are lower for Alternative 6B and 6C than for Alternative 1, we also expect that implementation of the Project under Alternative 6B and/or 6C would decrease the public's health risk due to UFP, relative to the No Build Alternative. As seen in Figures 4.22 through 4.26 (maximum 24-hour average) and Figures 4.49 through 4.53 (annual average), exhaust $PM_{2.5}$ concentration impacts from the I-710 freeway (and freight corridor, if applicable) are lower than 2008 impacts for all 2035 alternatives (with the exception of 5 model grid point right next to the freight corridor in Alternative 6A). Figures 4.35 through 4.38 (maximum 24-hour average) and Figures 4.54 through 4.57 (annual average) show that I-710 near-roadway exhaust $PM_{2.5}$ concentrations for the 2035 Alternatives 6B and 6C were generally higher than the 2035 Alternative 1 (No-Build Alternative), which was lower than incremental concentration impacts in the 2035 Alternatives 5A and 6A. The near-roadway modeling confirms the conclusion of the emissions analyses: the implementation of the Project under Alternative 6B and/or 6C would

[57] Ospital, J, "Health Studies & Near Roadway Issues," South Coast Air Quality Management District, December 2009.

[58] SCAQMD. Presentation to the I-710 Corridor Project Community Advisory Committee (CAC). "Preliminary Results From the AQMD I-710 Air Monitoring Study," South Coast Air Quality Management District, February 18, 2010, www.metro.net/projects_studies/I710/images/AQMD-I-710-Air-Monitoring-Study-to-CAC-February-2010.pdf.

[59] The rationale for this choice is that both UFP and $PM_{2.5}$ emissions are primarily the result of internal combustion processes.

decrease the public's health risk due to UFP, relative to the Alternative 1 (No Build Alternative), even near the I-710 freeway and freight corridor.

Lastly, some technical analyses have used CO concentrations as a surrogate for UFP particle number impacts. As seen in Tables 4.3a through 4.3c, calculated CO emissions for all of the 2035 Alternatives decrease more sharply than exhaust $PM_{2.5}$ emissions in the Area of Interest and along the I-710 freeway compared to the 2008 baseline. Near-roadway modeling of the I-710 freeway (and freight corridor, if applicable) shows no increases in 1-hour or 8-hour CO concentrations in any 2035 alternative compared to the 2008 baseline. The relative reductions among the 2035 alternatives are essentially the same as for exhaust $PM_{2.5}$, although all reductions are proportionally larger. Therefore, use of CO as a surrogate for UFP particle number impacts would be similar to those when exhaust $PM_{2.5}$ is used as a surrogate, only public exposure to UFP would decrease even further compared to 2008, even for those in close proximity to the I-710 freeway and/or freight corridor.

4.7 Carbon Monoxide "Hot-Spot" Analysis

Transportation conformity review at the project-level is required if the area in which a project is proposed is nonattainment or maintenance for CO and/or particulate matter. Requirements in 40 CFR 93.116 include that a transportation project must not cause or contribute to new CO violations, or increase the frequency or severity of any existing violations, or delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in nonattainment and maintenance areas. The proposed I-710 project is located within an attainment/maintenance area for CO. Based on this designation a project-level hot-spot analysis is required for CO.

In general, the procedures outlined in the "Transportation Project-Level Carbon Monoxide Protocol" (commonly referred to as the "CO Protocol" were applied for the CO impact assessment. Through the interagency consultation process, the approach suggested in the CO Protocol was modified slightly to incorporate the use of the EPA-approved mobile source dispersion model CAL3QHC to model representative worst-case congested intersections throughout the project's Area of Interest (AOI).

Based on traffic study data, afternoon (PM) peak-hour data were considered the worst-case scenario and used as the basis for the intersection selection and "hot spot" modeling process. Because traffic conditions (delay) under Alternative 6B were generally worse compared to the other 'build' alternatives, modeling results associated with projected future conditions at 10 selected intersections under Alternative 6B were used to quantitatively assess the potential for traffic-related impacts of the project and its alternatives. Table 4.12 summarizes the results of the hot-spot modeling. Appendix H presents the details of the CO hot-spot analysis.

Table 4.12 Maximum Predicted CO Concentrations

Intersection	Averaging Period	2008 Existing	2035 Alt. 1 No-Build	2035 Alt. 6B
#157 Garfield Ave at Gage Ave	1-hour	7.6	7	7
	8-hour	5.4	5.0	5.0
#26 Willow St. at Santa Fe Ave	1-hour	7.4	6.9	6.9
	8-hour	5.2	4.9	4.9
#34 Del Amo Blvd at Santa Fe Ave	1-hour	7.5	6.9	6.9
	8-hour	5.3	4.9	4.9
#44 Alondra Blvd at Garfield Ave	1-hour	7.4	6.8	6.8
	8-hour	5.2	4.8	4.8
#155 Wilmington at 223rd	1-hour	7.4	6.9	7
	8-hour	5.2	4.9	5.0
#38 Del Amo Blvd at Lakewood Blvd	1-hour	7.7	6.9	6.9
	8-hour	5.4	4.9	4.9
#23 Pacific Coast Hwy at Cherry Ave	1-hour	7.4	7	6.9
	8-hour	5.2	5.0	4.9
#60 Firestone Blvd at Atlantic Ave	1-hour	7.4	6.9	6.9
	8-hour	5.2	4.9	4.9
#148 Wardlow at Cherry Ave	1-hour	7.3	6.8	6.8
	8-hour	5.2	4.8	4.8
#140 Ocean Blvd @ Golden Short St.	1-hour	7.4	6.9	6.9
	8-hour	5.2	4.9	4.9

Notes:
Background value of 6 ppm was added to the 1-hour concentrations for existing and 2035 and then the EPA default persistence factor 0.7 was applied
The 1-hour and 8-hour NAAQS for CO are 35 ppm and 9 ppm respectively.

The hot spot analysis assessed the potential for localized CO impacts due to the project and whether the project alternatives would either cause violation of the CO ambient air quality standards, or exacerbate the air quality conditions to delay the progress of meeting attainment of the standard. Based on the modeling performed using EPA-approved methods, assumptions and tools and the traffic study data, the project or its alternatives would not cause CO concentrations to exceed the CO standards or delay the timely attainment of the standards.

4.8 PM_{10}/$PM_{2.5}$ Qualitative "Hot-Spot" Analyses

LSA prepared the PM_{10}/$PM_{2.5}$ Qualitative "Hot-Spot" Analyses. Transportation conformity is required under Section 176(c) of the CAA to ensure that federally supported highway and transit project activities are consistent with the purpose of the SIP. Conformity for the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant AAQS. As required by the 2006 Final Rule, this qualitative $PM_{2.5}$ and PM_{10} hot-spot analysis demonstrates that this project meets the CAA conformity requirements to support State and local air quality goals with respect to potential localized air quality impacts.

It is not expected that changes to $PM_{2.5}$ and PM_{10} emissions levels associated with the proposed project would result in new violations of the federal air quality standards for the following reasons:

- Based on the local monitoring data, the 24-hour $PM_{2.5}$ concentrations within the project area would be reduced to 29 percent below the federal standard by 2015 and 76 percent below the federal standard by 2035.
- Based on the local monitoring data, the annual average $PM_{2.5}$ concentrations within the project area would be reduced to 27 percent below the federal standard by 2015 and 76 percent below the federal standard by 2035.
- With the exception of 2007, the ambient PM_{10} concentrations have not exceeded the 24-hour or annual federal standard.
- Based on the projected PM_{10} concentrations listed in the 2007 AQMP, the 24-hour PM_{10} concentrations would be 49 percent below the federal standard by 2015 and 85 percent below the federal standard by 2035.
- The project would increase the regional $PM_{2.5}$ emissions by up to 24 percent when compared to the existing conditions. This increase is less than 76 percent reduction in regional $PM_{2.5}$ concentrations by 2035. If re-entrained dust is excluded from the calculations, all of the project alternatives would reduce the $PM_{2.5}$ emissions when compared to the existing conditions.
- The project would increase the regional PM_{10} emissions by up to 68 percent when compared to the existing conditions. This increase is less than 85 percent reduction in regional PM_{10} concentrations by 2035. If re-entrained dust is excluded from the calculations, all of the project alternatives would reduce the PM_{10} emissions when compared to the existing conditions.

For these reasons, future new or worsened $PM_{2.5}$ and PM_{10} violations of any standards are not anticipated; therefore, the project meets the conformity hot-spot requirements in 40 CFR 93-116 and 93-123 for both $PM_{2.5}$ and PM_{10}.

5 Summary AQ/HRA Results Comparison for Project Alternatives

This Chapter summarizes the comparison of results among the Project Alternatives. The comparisons presented in this chapter generally reflect a comparison of peak impacts, regardless of location or time. They do not reflect broader impact differences throughout the Basin, I-710 Study Area of Interest and/or along the I-710 freeway itself. For example, incremental DPM emissions can be lower in many areas while the peak location can show an incremental increase in DPM emissions. A comprehensive comparison of alternatives should consider both peak incremental impacts (summarized below) and broader impacts (presented in Chapter 4 and referenced below).

5.1 Construction Emissions Comparison

As stated in Section 4.2.1, the peak day construction emissions are based on an assumption that the worst case construction scenario would occur, simultaneous construction of seven project segments over the project's 18 mile length. However, it is highly improbable that construction would be occurring over multiple segments (much less all segments) on any given day. In addition, emissions from one segment would have a minimal or no localized impact on people near the other segments. Thus, peak day emissions for the segment with the greatest peak day emissions were also calculated. Table 5.1 summarizes the construction emissions results. Details can be found in Section 4.2 and Appendix B.

Table 5.1 Peak-Day Construction Emissions

POLLUTANT	PEAK DAY (All Segments Total) (lbs/day)		PEAK DAY (Single Segment) (lbs/day)		SCAQMD CEQA Threshold* (lbs/day)
	Alt. 5A	Alt. 6A/B/C	Alt. 5A	Alt. 6A/B/C	
NO_x	1364	1510	287	287	100
CO	986	1001	177	177	550
PM_{10}	435	482	69	69	150
Exhaust	*25*	*27*	*4*	*4*	-
Fugitive Dust	*410*	*455*	*65*	*65*	
$PM_{2.5}$	117	129	21	21	55
Exhaust	*52*	*57*	*11*	*11*	-
Fugitive Dust	*65*	*72*	*10*	*10*	
ROG	193	213	40	40	75

Notes:
*The SCAQMD significance thresholds are presented for information only. Caltrans has not adopted them but has stated that it will use them as part of its significance determination. Emissions are from construction equipment/activities
No green construction equipment
Values for exhaust and fugitive dust are not peak values, but represent the constituents of PM_{10} and $PM_{2.5}$ on the peak day
Assumed that all seven segments are constructed simultaneously (Maximum construction duration 87.4 months)
All Numbers are rounded to an integer value

Summary: Peak-day construction emissions for Alternatives 6A/6B/6C are similar to those for Alternative 5A. Construction of the freight corridor would require additional days of construction, but do not affect peak day emissions appreciably. Peak-day emissions of all pollutants in any single segment are less than the SCAQMD's significance thresholds, except for NOx. The segment peak-day emissions are the same for Alternative 5A and Alternatives 6A/6B/6C because peak-day emissions occur during freeway mainline widening and/or location shifting. Construction phasing and staging may further reduce peak-day emissions. The emission calculations do not account for Metro's recently adopted Green Construction Policy.

5.2 Traffic Criteria Pollutant Emissions Results Comparisons

Tables 5.2a and 5.2b compare emission estimates from each of the project alternatives against the 2008 Baseline inventory and Alternative 1 emission estimates, respectively. These comparisons are performed for each of the criteria pollutants and for the three project study areas (SCAB, I-710 Study Area of Interest (AOI) and the I-710 Freeway itself, which can include the freight corridor); see Figure 4.1. Details can be found in Section 4.3.3, Figures 4.2-4.11, and Appendix C.

Table 5.2a Comparison of Incremental Criteria Pollutant Emissions for All Alternatives compared to 2008, for all Study Areas*,**

Pollutant	Study Area	Comparison with 2008 Baseline					SCAQMD CEQA Mass Emission Thresholds**
		Alt.1 vs. 2008	Alt 5A vs. 2008	Alt. 6A vs. 2008	Alt. 6B vs. 2008	Alt. 6C vs. 2008	
		(lbs/day)	(lbs/day)	(lbs/day)	(lbs/day)	(lbs/day)	(lbs/day)
NO_x	SCAB	-870,000	-870,000	-870,000	-880,000	-880,000	55
	AOI	-200,000	-200,000	-200,000	-200,000	-200,000	-
	I710	-13,000	-13,000	-11,000	-15,000	-14,000	
CO	SCAB	-2,000,000	-2,000,000	-2,000,000	-2,000,000	-2,000,000	550
	AOI	-510,000	-510,000	-510,000	-510,000	-510,000	-
	I710	-19,000	-17,000	-16,000	-18,000	-18,000	
PM_{10} (Total)	SCAB	23,000	23,000	24,000	23,000	23,000	150
	AOI	1,800	1,900	2,100	1,800	1,800	-
	I710	230	580	1,300	1,000	920	
PM_{10} (Exhaust)	*SCAB*	*-9,500*	*-9,400*	*-9,400*	*-9,800*	*-9,700*	
	AOI	*-3,400*	*-3,400*	*-3,300*	*-3,600*	*-3,600*	
	I710	*-300*	*-190*	*-10*	*-330*	*-290*	
PM_{10} (Entrained)	*SCAB*	*33,000*	*33,000*	*33,000*	*33,000*	*33,000*	
	AOI	*5,200*	*5,300*	*5,400*	*5,500*	*5,400*	
	I710	*530*	*770*	*1,300*	*1,400*	*1,200*	

Pollutant	Study Area	Comparison with 2008 Baseline					SCAQMD CEQA Mass Emission Thresholds**
		Alt.1 vs. 2008	Alt 5A vs. 2008	Alt. 6A vs. 2008	Alt. 6B vs. 2008	Alt. 6C vs. 2008	
		(lbs/day)	(lbs/day)	(lbs/day)	(lbs/day)	(lbs/day)	(lbs/day)
$PM_{2.5}$ (Total)	SCAB	-2,300	-2,300	-2,200	-2,500	-2,400	55
	AOI	-2,000	-1,900	-1,900	-2,100	-2,100	-
	I710	-170	-40	230	0	0	
$PM_{2.5}$ (Exhaust)	*SCAB*	*-10,000*	*-10,000*	*-10,000*	*-11,000*	*-11,000*	
	AOI	*-3,200*	*-3,200*	*-3,200*	*-3,400*	*-3,400*	
	I710	*-300*	*-230*	*-90*	*-340*	*-300*	
$PM_{2.5}$ (Entrained)	*SCAB*	*8,100*	*8,100*	*8,100*	*8,100*	*8,100*	
	AOI	*1,300*	*1,300*	*1,300*	*1,300*	*1,300*	
	I710	*130*	*190*	*320*	*330*	*300*	
ROG	SCAB	-170,000	-160,000	-170,000	-170,000	-170,000	55
	AOI	-43,000	-43,000	-44,000	-44,000	-44,000	-
	I710	-1,500	-1,500	-1,300	-1,600	-1,600	
SO_2	SCAB	1,300	1,300	1,300	1,200	1,300	150
	AOI	160	160	160	140	150	-
	I710	15	23	36	13	15	

* Numbers rounded to 2 significant figures. Emission changes of 1% or smaller are presented as zero emission changes.

** The SCAQMD significance thresholds are presented for information only. Caltrans has not adopted them but has stated that it will use them as part of its significance determination.

Each of the alternatives will result in lower NO_x, CO, $PM_{2.5}$ (except Alternative 6A along the I-710 freeway) and ROG emissions for all study areas when compared to the 2008 baseline emissions (CEQA baseline). The greatest reductions from the 2008 baseline occur in Alternatives 6B and 6C, which include a zero-emissions freight corridor.

Total traffic-related PM emissions consist of exhaust emissions (which includes direct brake and tire wear) and entrained emissions (particulate matter from roadways lifted into the air by vehicle motion). For entrained PM emissions, this study used the latest EPA methodology (January 2011) with local inputs. This methodology increases entrained emissions as a direct function of vehicle miles travelled (VMT). Thus, each of the 2035 alternatives show an increase (~34%) in entrained PM emissions compared to the 2008 baseline. This increase offsets reductions in exhaust PM emissions in future years (as engine and control technology outpaces the effect of the increase in VMT). For $PM_{2.5}$, exhaust emission decreases are great enough that total $PM_{2.5}$emissions still decrease for all study areas (except for Alternative 6A, along the I-710 freeway). But for PM_{10}, calculated increases in entrained emissions are much greater than exhaust PM_{10} reductions, resulting in large calculated increases in PM_{10} emissions in all study areas for all 2035 alternatives compared to 2008.

NOTE ON TOTAL PM EMISSION RESULTS: After the I-710 Corridor Project emission calculations were completed, SCAQMD has proposed a modified methodology for entrained PM emissions[60] as part of their 2012 AQMP development, consistent with their approach used in the 2007 AQMP. In SCAQMD's proposed methodology, 2008 PM_{10} and $PM_{2.5}$ estimates will be lower, particularly $PM_{2.5}$ estimates. Most importantly, future year entrained PM will remain constant unless the roadway is lengthened. Thus, actual PM impacts for the project alternatives (compared to the 2008 baseline) will be more similar to the exhaust PM impacts reflected in tables 5.2a and 5.2b than the results presented for total PM impacts.

Exhaust $PM_{2.5}$ and PM_{10} emissions decrease for each 2035 alternative in each study area, compared to 2008. The greatest decreases are in Alternative 6B, followed by Alternative 6C and Alternative 1 (No-Build) having similar decreases, then Alternative 5A, and Alternative 6A having the least decreases.

Incremental SO_2 emissions for each alternative increase in the SCAB (compared to the 2008 baseline); the greatest increase is along the I-710 freeway and smallest increase in the AOI. Alternative 6A has the greatest increase along the I-710 freeway. This increase results from forecasted increases in VMT; the 2008 baseline already reflects the requirement for trucks to use ultralow sulfur diesel fuels in California that was adopted before 2008. SO_2 emissions for all 2035 alternatives show similar increases of about 0.65 tons/day. It should be noted that the SCAQMD has recently adopted amendments to its SO_x RECLAIM rule that will further reduce SO_x emissions by about 5.4 tons/day. In addition, implementation of CARB rules and the Ports' Clean Air Action Plan is projected to reduce SO_x emissions from other goods movement sources (e.g. ocean-going vessel) over 20 tons/day. Most SO_x RECLAIM and ocean-going vessel emission reductions will occur upwind of the I-710 Study Area of Interest.

The comparison of the 2035 build alternatives (Alternatives 5A, 6A, 6B, and 6C) compared to Alternative 1 (NEPA baseline) is presented in Table 5.2b. In this comparison, the impacts of general VMT increases from 2008 are eliminated, although smaller VMT differences among the 2035 Alternatives remain.

[60] See www.aqmd.gov/gb_comit/stmpradvgrp/2012AQMP/meetings/2011/dec15/PavedRoadDust.pdf

Table 5.2b Comparison of Incremental Criteria Pollutant Emissions for All Build Alternatives compared to Alternative 1 (No-Build), for all Study Areas*

Pollutant	Study Area	Comparison with 2035 Alternative 1			
		Alt. 5A vs. Alt. 1	Alt. 6A vs. Alt. 1	Alt. 6B vs. Alt. 1	Alt. 6C vs. Alt. 1
		lbs/day	lbs/day	lbs/day	lbs/day
NO_x	SCAB	0	0	-4,600	-3,600
	AOI	0	0	-4,000	-3,200
	I710	300	2,000	-2,000	-1,500
CO	SCAB	0	0	0	0
	AOI	0	0	-1,900	0
	I710	1,400	2,900	650	930
PM_{10} (Total)	SCAB	0	0	0	0
	AOI	0	0	0	0
	I710	360	1,100	790	690
PM_{10} (Exhaust)	*SCAB*	*0*	*0*	*0*	*0*
	AOI	*0*	*0*	*-240*	*-170*
	I710	*110*	*290*	*-35*	*9*
PM10 (Entrained)	*SCAB*	*0*	*0*	*0*	*0*
	AOI	*0*	*0*	*0*	*0*
	I710	*250*	*780*	*830*	*680*
$PM_{2.5}$ (Total)	SCAB	0	0	0	0
	AOI	0	0	0	0
	I710	130	400	170	160
$PM_{2.5}$ (Exhaust)	*SCAB*	*0*	*0*	*0*	*0*
	AOI	*0*	*0*	*-200*	*-140*
	I710	*74*	*210*	*-37*	*0*
PM2.5 (Entrained)	*SCAB*	*0*	*0*	*0*	*0*
	AOI	*0*	*0*	*0*	*0*
	I710	*61*	*190*	*200*	*170*
ROG	SCAB	0	0	0	0
	AOI	0	-220	-530	-470
	I710	30	190	-110	-82
SO_2	SCAB	0	0	0	0
	AOI	0	0	-24	-19
	I710	8	21	-2	1

* Numbers rounded to 2 significant figures. Emission changes of 1% or smaller are presented as zero emission changes.

For the SCAB and I-710 Study Area of Interest, the incremental impacts of Alternative 5A and Alternative 6A for ALL pollutants compared to 2035 Alternative 1 is essentially zero (less than a

1% difference). NOx, PM_{10} exhaust, $PM_{2.5}$ exhaust generally decrease in Alternative 6B and 6C (compared to Alternative 1) in these study areas, but in general, the differences are small or less than 1%. Note that SOx emissions, which increased in all 2035 alternatives compared to 2008, are essentially the same for the build alternatives compared to Alternative 1.

Along the I-710 freeway (including the freight corridor, if applicable), only Alternative 6B and Alternative 6C show decreases in emissions (mostly NOx and ROG) compared to Alternative 1 (No-Build). Otherwise, all build alternatives have increased emissions along the I-710 freeway compared to Alternative 1, with the greatest increases for Alternative 6A and then Alternative 5A.

Summary: Exhaust emissions decrease for all 2035 alternatives in all study areas compared to 2008 (the exception is SO_2 – see discussion above). Entrained PM emissions, particularly PM_{10}, increase in all 2035 alternatives, resulting in increases in total PM_{10} for all 2035 alternatives in all study areas. Exhaust emissions are essentially the same (or have a slight decrease) for all 2035 build alternatives compared to Alternative 1 for both the SCAB and I-710 Study AOI.

Emissions for the 2035 build alternatives generally increase compared to Alternative 1 along the I-710 freeway (and freight corridor, if applicable), although some of them decrease for Alternative 6B and, to a lesser extent, Alternative 6C. The recently proposed SCAQMD entrained PM emissions methodology[61] would both decrease the absolute value of 2008 entrained PM emissions and would hold entrained PM levels constant in future years unless a roadway is lengthened. Thus, total PM impacts would likely be smaller and more similar to exhaust PM impacts.

> **NOTE**: Figures 4.2 through 4.11 present incremental impacts of NOx, total $PM_{2.5}$ and exhaust $PM_{2.5}$ spatially throughout the I-710 Study Area of Interest. This information augments the tabular results of total emission changes in the AOI and I-710 Freeway study areas, highlighting spatial variations of incremental emission impacts.

5.3 I-710 Near-Roadway Air Quality Impacts Comparisons

As can be seen in the previous section, the greatest emission impacts occur along the I-710 freeway. This occurs as the increased VMT (all alternatives) and increased capacity (build alternatives) increases emissions along the I-710 freeway, although improved mobility and less traffic on local roadways can decrease emissions in the larger AOI and SCAB study areas. To address this, air quality impacts (incremental criteria pollutant concentration impacts) resulting from emissions from the I-710 freeway (including freight corridor) were modeled using the EPA-approved AERMOD dispersion model. Table 5.3a presents a summary of the NO_2 and CO modeling results. For NO_2 and CO, the incremental impacts calculated using AERMOD were added to nearby monitored concentrations and the maximum sum of these values is reported in Table 5.3a as the maximum impact. Details can be found in Section 4.34, Figures 4.12-4.38, and Appendix D.

[61] See www.aqmd.gov/gb_comit/stmpradvgrp/2012AQMP/meetings/2011/dec15/PavedRoadDust.pdf

Table 5.3a Comparison of I-710 Freeway Near-Roadway NO_2 and CO Concentration Impacts for All 2035 Alternatives Compared to 2008

Scenario		Nitrogen Dioxide (NO_2) ($\mu g/m^3$)		Carbon Monoxide (CO) ($\mu g/m^3$)	
		1-hour	Annual	1-hour	8-hour
Alternative 1 vs. 2008 Baseline	Incremental Impact	-81	-1	-211	-36
	Maximum Impact*	**145**	**56**	**9,000**	**7,300**
Alternative 5A vs. 2008 Baseline	Incremental Impact	-79	-1	-203	-34
	Maximum Impact*	**146**	**56**	**9,000**	**7,300**
Alternative 6A vs. 2008 Baseline	Incremental Impact	-70	5	-241	-37
	Maximum Impact*	**156**	**62**	**8,900**	**7,300**
Alternative 6B vs. 2008 Baseline	Incremental Impact	-84	-1	-254	-40
	Maximum Impact*	**141**	**56**	**8,900**	**7,300**
Alternative 6C vs. 2008 Baseline	Incremental Impact	-84	-1	-254	-39
	Maximum Impact*	**142**	**56**	**8,900**	**7,300**
SCAQMD CEQA Threshold Level**		339	56	23,000	10,000
National Ambient Air Quality Standard Level		188	100	40,000	10,000

* Maximum Impact is the maximum concentration (background + project incremental) in the modeling domain.
** The SCAQMD significance thresholds are presented for information only. Caltrans has not adopted them but has stated that it will use them as part of its significance determination.

The SCAB is in attainment of the federal standards (NAAQS) for these pollutants. The maximum impacts for all alternatives are less than the applicable SCAQMD local significance threshold, CAAQS and NAAQS except for Alternative 6A (maximum NO_2 level exceeds the CAAQS, which is the SCAQMD's threshold). As noted in Section 4.3.4, only the calculated annual NO_2 ambient concentration for Alternative 6A exceeds the CAAQS level, and at only one receptor location, which is ~10 meters from the center of the freight corridor.

Table 5.3b presents a summary of the incremental PM_{10} and $PM_{2.5}$ modeling results compared to 2008. The SCAB is a designated non-attainment area for these pollutants, both of the CAAQS and NAAQS[62].

[62] SCAQMD submitted a request for attainment redesignation for the PM_{10} NAAQS in December 2010; EPA has not taken action on that request.

Table 5.3b Comparison of I-710 Freeway Near-Roadway Incremental PM_{10} and $PM_{2.5}$ Concentration Impacts for All 2035 Alternatives Compared to 2008

Scenario	Maximum Incremental Impacts (µg/m³)					
	PM_{10}				$PM_{2.5}$	
	Total		Exhaust		Total	Exhaust
	24-Hour	Annual	24-Hour	Annual	24-Hour	24-Hour
Alternative 1 vs. 2008 Baseline	20	14	-0.1	-0.01	0	-0.1
Alternative 5A vs. 2008 Baseline	61	36	5.7	3.1	15	2.0
Alternative 6A vs. 2008 Baseline	79	44	6.3	3.6	21	3.9
Alternative 6B vs. 2008 Baseline	74	43	2.3	1.8	15	1.2
Alternative 6C vs. 2008 Baseline	64	35	2.2	1.7	13	1.0
SCAQMD CEQA Threshold Level*	2.5	1	*2.5***	*1***	2.5	*2.5***

* The SCAQMD significance thresholds are presented for information only. Caltrans has not adopted them but has stated that it will use them as part of its significance determination.
** Thresholds would refer to total PM and are provided for exhaust-only PM for comparison purposes only.

Peak incremental total PM_{10} and $PM_{2.5}$ impacts for the alternatives compared to 2008 are very high. Figures 4.12 through 4.26 show that impacts above the SCAQMD's local significance threshold all occur within 100 to 300 meters of the I-710 freeway (mainline and/or freight corridor). These increases are partly due to the spatial shifting of the mainline and/or freight corridor into new locations (and thus baseline concentrations are much, much lower). Peak incremental exhaust PM_{10} and $PM_{2.5}$ impacts for all alternatives compared to 2008 are much lower. Figures 4.12 through 4.26 show that exhaust PM impacts above the SCAQMD's local significance threshold (compared to total PM impacts) are much less prevalent in all project alternatives, and are almost completely absent in Alternative 6B and Alternative 6C.

All 2035 build alternatives have increases in CO and NO_2 concentrations in certain locations along the I-710 freeway compared to 2035 Alternative 1 (No-Build). This is consistent with the increased number of vehicles expected on the I-710 in the build alternatives. These increases are greatest along the I-710 freeway, particularly where the freeway mainline is shifted and/or the freight corridor is constructed. Near these locations, decreases in CO and NO_2 are seen (as traffic is shifted from those areas). The pattern is similar to the one seen in the exhaust $PM_{2.5}$ and PM_{10} concentrations in the build alternatives compared to Alternative 1 (see discussion below).

The comparison of the 2035 build alternatives to Alternative 1 (No-Build) is based on analysis of the modeling results shown in Figures 4.27 – 4.30 (annual average PM_{10}), Figures 4.31 – 4.34 (24-hour average PM_{10}), Figures 4.35 – 4.38 (24-hour average $PM_{2.5}$), and Figures 4.54 – 4.57 (annual average $PM_{2.5}$). Drawing from the local roadways, there is more traffic on the I-710 in the build alternatives than in the no-build alternative (Alternative 1). In the EPA method, VMT increases will result in greater entrained PM emissions (and related impacts) on the widened freeway and along freight corridor as trucks move into those lanes in the build alternatives; this is seen for all build alternatives. For PM_{10}, these entrained PM increases offset even the reduced exhaust emissions in Alternatives 6B and 6C (zero-emission freight corridor), resulting in increases in total PM_{10} all along the I-710 freeway (greatest in Alternative 6A and least in Alternative 5A). These increases can range as far as 300 meters from the freeway.

For $PM_{2.5}$, these entrained PM emission increases are more similar to the changes in exhaust PM (which can decrease as a result of greater mobility in the build alternatives or increase as a result of higher traffic levels than in Alternative 1). As a result, total $PM_{2.5}$ levels in the build alternatives are greater than in Alternative 1 at some locations along the I-710, generally within 100 meters of the roadway. The greatest impacts are seen in Alternative 6A compared to Alternative 1; the fewest in Alternative 5A.

If only exhaust PM is considered, the results of comparing the build alternatives to Alternative 1 yield similar conclusions as above, although the incremental impacts are, of course, lower. For Alternatives 6B and 6C, only a few modeling receptors next to the I-710 roadway show any $PM_{2.5}$ increases compared to Alternative 1.

Summary: The incremental emissions analysis (Section 5.2) showed that the study area with the greatest impacts was along the I-710 freeway (including freight corridor, if applicable). AERMOD dispersion modeling was conducted to assess near-roadway impacts along the I-710. Principally, none[63] of the 2035 alternatives is expected to result in an exceedence of the CAAQS or NAAQS for NO_2 and CO. Incremental total PM_{10} and $PM_{2.5}$ impacts of the 2035 alternatives (compared to 2008) are above the SCAQMD's significance threshold within 100 to 300 meters of the I-710 freeway mainline and/or freight corridor, with the extent of impacts smallest in Alternative 1 (impacts mostly south of the I-105). Incremental exhaust PM_{10} and $PM_{2.5}$ impacts (compared to 2008) were much smaller, with no impacts greater than the SCAQMD's significance threshold for Alternatives 1, 6B, and 6C. Consistent with movement of traffic to the I-710 freeway from the local roadways in the build alternatives, criteria pollutant concentrations right along the I-710 are often higher in the build alternatives compared to the no-build alternative (Alternative 1). This is especially the case for total PM concentrations because entrained PM emission changes are directly proportional to increases in VMT (EPA method, not with the proposed SCAQMD/CARB method). The level and extent of the increases is smaller for total $PM_{2.5}$ (<100 meters, fewer locations) than for total PM_{10} (up to 300 meters along most of the length of the freeway), and for exhaust $PM_{2.5}$, smallest for Alternatives 6B and 6C (compared to Alternative 1) with 6 or fewer model receptor grids showing any appreciable increases.

[63] The exceedence of the NO_2 CAAQS at one grid receptor less than 10 meters from the freight corridor for Alternative 6A should be considered in light of the model's ability (or lack of ability) to calculate impacts that close to the source.

5.4 Mobile Source Air Toxics (MSAT) Emissions Results Comparisons Summary

Table 5.4a presents an analysis of MSAT incremental emissions for each of the alternatives compared with the 2008 base year inventory for all study areas. Table 5.4b presents a similar comparative analysis incremental emissions of each of the 2035 build alternatives compared to Alternative 1 (No-Build). Details can be found in Section 4.3.5, Figures 4.39-4.43, and Appendix C.

Table 5.4a Comparison of Incremental Air Toxics Emissions for All Alternatives compared to 2008, for all Study Areas

Mobile Source Air Toxic Name	Study Area	Comparison to 2008 Baseline				
		Alt. 1 vs. 2008	Alt. 5A vs. 2008	Alt. 6A vs. 2008	Alt. 6B vs. 2008	Alt. 6C vs. 2008
		lb/day	lb/day	lb/day	lb/day	lb/day
Diesel Particulate Matter	SCAB	-23,000	-23,000	-23,000	-23,000	-23,000
	AOI	-5,500	-5,400	-5,400	-5,600	-5,600
	I710	-390	-350	-230	-460	-430
Benzene	SCAB	-3,000	-3,000	-3,000	-3,000	-3,000
	AOI	-760	-760	-760	-760	-760
	I710	-22	-21	-21	-21	-21
Acetaldehyde	SCAB	-600	-600	-600	-600	-600
	AOI	-150	-150	-150	-150	-150
	I710	-5	-4	-4	-4	-4
Formaldehyde	SCAB	-2,300	-2,300	-2,300	-2,300	-2,300
	AOI	-580	-580	-580	-580	-580
	I710	-17	-16	-16	-16	-16
1,3- butadiene	SCAB	-700	-700	-700	-700	-700
	AOI	-180	-180	-180	-180	-180
	I710	-5	-5	-5	-5	-5
Acrolein	SCAB	-160	-160	-160	-160	-160
	AOI	-41	-41	-41	-41	-41
	I710	-1	-1	-1	-1	-1

Table 5.4b Comparison of Incremental Air Toxics Emissions for All Alternatives Compared to Alternative 1 (No-Build), for all Study Areas*

Mobile Source Air Toxic Name	Study Area	Comparison to 2035 Alternative 1 (No-Build)			
		Alt. 5A vs. Alt. 1	Alt. 6A vs. Alt. 1	Alt. 6B vs. Alt. 1	Alt. 6C vs. Alt. 1
		lbs/day	lbs/day	lbs/day	lbs/day
Diesel Particulate Matter	SCAB	0	96	-140	-94
	AOI	27	110	-130	-82
	I710	44	160	-71	-38
Benzene	SCAB	0	0	0	0
	AOI	0	-1.4	-1.4	-1.3
	I710	0.4	0.6	0.6	0.6
Acetaldehyde	SCAB	0	0	0	0
	AOI	0	-0.2	-0.2	-0.1
	I710	0.04	0.06	0.06	0.06
Formaldehyde	SCAB	0	0	0	0
	AOI	0	-0.9	-0.9	-0.8
	I710	0.3	0.4	0.4	0.4
1,3- butadiene	SCAB	0	0	0	0
	AOI	0	-0.3	-0.3	-0.3
	I710	0.1	0.1	0.1	0.1
Acrolein	SCAB	0	0	0	0
	AOI	0	-0.07	-0.07	-0.07
	I710	0.02	0.03	0.03	0.03

* Numbers rounded to 2 significant figures. Emission changes of 1% or smaller are presented as zero emission changes.

Summary: In every instance (all alternatives, all study areas), decreases in incremental MSAT emissions compared to 2008 were calculated. Reductions in DPM (the main risk driver) were approximately 78% (SCAB), 77% to 81% (AOI), and 38% to 76% along the I-710 freeway. Compared to 2008, reductions were greatest for Alternative 6B with Alternative 6C, Alternative 1, Alternative 5A, and Alternative 6A, following in descending order.

Compared to Alternative 1, DPM emissions (the main risk driver) increased for Alternative 6A in all study areas, whereas Alternative 5A DPM emissions were similar in the SCAB and I-710 Study AOI and increased along the I-710. Alternative 6B and Alternative 6C DPM emissions decreased in all study areas, with the greatest decreases in Alternative 6B.

5.5 I-710 Near-Roadway Incremental Health Risk Impacts Comparisons

As with criteria air pollutants, the greatest air toxic emission impacts occur along the I-710 freeway. This occurs as the increased VMT (all alternatives) and increased capacity (build alternatives) increases emissions along the I-710 freeway, although improved mobility and less traffic on local roadways can decrease emissions in the larger AOI and SCAB study areas. To address this, incremental health risk impacts (cancer risk and non-cancer acute and chronic hazard indices) resulting from emissions from the I-710 freeway (including freight corridor) were modeled. Table 5.5 compares maximum relative health impacts between each of the Alternatives and the 2008 base year.

Table 5.5 Comparison of Incremental MSAT Health Risk Impacts for All Alternatives Compared to 2008
(All analyses based on worst-case residential scenario impacts)

Health Impact	Alt. 1 vs. 2008	Alt. 5A vs. 2008	Alt. 6A vs. 2008	Alt. 6B vs. 2008	Alt. 6C vs. 2008	SCAQMD Significance Threshold*
Cancer Risk (Risk in 1 million)	-6	-6	462**	-7	-7	10 in 1 million
Chronic Non-Cancer Hazard Index (unitless)	-0.004	-0.004	0.279	-0.005	-0.005	1.0 (Hazard Index)
Acute Non-Cancer Hazard Index (unitless)	-0.017	-0.016	0.079	0.102	-0.0001	1.0 (Hazard Index)

* The SCAQMD significance thresholds are presented for information only. Caltrans has not adopted them but has stated that it will use them as part of its significance determination.
** Only 15 grid points show incremental increases above 10 in a million. These grid points are **NOT** in residential areas and are generally located very near the freight corridor. The incremental cancer risk and incremental hazard indices decreased at all sensitive receptors in the modeling domain.

All 2035 alternatives (compared to 2008) show decreases in cancer risk (including 6A for residential areas) and hazard indices far below the SCAQMD's significance thresholds. Cancer risk and hazard indices decrease throughout the modeling domain for all 2035 alternatives except for Alternative 6A in non-residential areas very near to the I-710 (mainline and/or freight corridor).

All 2035 build alternatives have increases in cancer risk in certain locations along the I-710 freeway compared to 2035 Alternative 1 (No-Build Alternative). Figures 4.44 through 4.48 show that Alternative 5A and Alternative 6A have large areas with greater cancer risk (compared to Alternative 1), including very large increases right along the I-710 freeway (mainline and/or freight corridor). Some of these increases are due to location shifting of the mainline or addition of the freight corridor; this can be seen when areas of greater and lower incremental impacts are seen in the same location such as in Figure 4.46 (e.g., paired increases/decreases around Washington Boulevard and at the I-710/I1-5). Alternative 6B and Alternative 6C (compared to Alternative 1) generally show lower levels of cancer risk until the freight corridor ends near the railyards. This is because trucks leaving the zero-emission freight corridor are analyzed as if they switch from zero emission technologies to conventional technologies (albeit cleaner than the 2008 truck fleet). Impacts in those areas would be reduced (compared to Alternative 1) if the trucks continued to use zero-emission technologies.

Summary: The incremental emissions analysis (Section 5.2) showed that the study area with the greatest MSAT emissions impacts was along the I-710 freeway (including freight corridor, if applicable). AERMOD dispersion and health risk modeling was conducted to assess near-roadway impacts along the I-710. Compared to 2008, cancer risk and hazard indices decrease throughout the modeling domain for all 2035 alternatives except Alternative 6A in non-residential areas very near to the I-710 (mainline and/or freight corridor).

All 2035 build alternatives have increases in cancer risk in certain locations along the I-710 freeway compared to 2035 Alternative 1 (No-Build Alternative). Until the freight corridor ends near the railyards, Alternative 6B and Alternative 6C have lower cancer risk impacts (compared to Alternative 1) while the other alternatives have greater cancer risk impacts. Cancer risk impacts north of Washington Boulevard are greater for all build alternatives, even for Alternatives 6B and 6C because it is assumed that trucks not on the freight corridor do not have zero-emission technologies.

5.6 Greenhouse Gas (GHG) Emissions Results Comparisons Summary

GHG emissions for the 2035 alternatives compared to 2008 are all approximately 22,000,000 tonnes CO_2e/year higher than the existing baseline, representing a 31% increase over 2008 as the effect of increases in VMT outweigh any improvement in the vehicle fleet. The analysis does not include the effect of recent Pavely Standard or other adopted state GHG reduction regulations, which would reduce 2035 GHG emissions for all alternatives.

Table 5.6 below summarizes the results of the traffic-related GHG emissions for all 2035 Build Alternatives compared to Alternative 1 (No Build Alternative). Details can be found in Section 4.4 and Appendix F.

Table 5.6 Incremental Traffic GHG Emissions in SCAB as Compared to Alternative 1 (No Build)

Greenhouse Gas	Alt. 5A vs. Alt. 1	Alt. 6A vs. Alt. 1	Alt. 6B vs. Alt. 1	Alt. 6C vs. Alt. 1
	tonnes/year	tonnes/year	tonnes/year	tonnes/year
CH_4	0.016	0.028	0.026	0.028
N_2O	1.1	1.9	1.8	1.9
CO_2	300	-120,000	-600,000	-490,000
Total (CO_2 eq)	670	-120,000	-600,000	-490,000

Note that Alternative 6B reduces GHG emissions by over a half million tons/year in 2035. With the exception of Alternative 5A, total greenhouse gas emissions are expected to be lower for all 2035 build alternatives when compared to Alternative 1. Alternative 5A is predicted to have slightly higher GHG emissions compared to Alternative 1.

5.7 AQ/HRA Alternatives Comparison Summary

As discussed in Chapter 4, multiple metrics were used to assess the AQ/HRA impacts of the project alternatives. A single metric cannot, and should not, be used to evaluate the full AQ/HRA impacts of any project alterative. The results of the different analyses should be considered together to give a fuller and more comprehensive understanding of project alternative AQ/HRA impacts. A full list of the I-710 EIR/EIS/AQ/HRA Analysis metrics can be found in Table 4.1; many of these analyses go beyond standard Caltrans' analyses. The preceding sections of this Chapter summarized the results of the quantitative analyses as part of a comparison among the project alternatives. All project alternatives, including Alternative 1 (No-Build), have locations of greater impacts, depending on the air quality metric used. In summary, the analyses show that:

- Criteria and air toxic exhaust emissions are generally lower (sometimes as much as $80\%^{+}$ lower) in the 2035 alternatives compared to 2008. The greatest reductions are in the SCAB and I-710 Study Area of Interest. The smallest reductions are along the I-710 freeway.
  - For the SCAB and I-710 Study Area of Interest, the incremental emission changes for all 2035 build alternatives (compared to 2035 Alternative 1) are essentially zero (less than a 1% difference) or slightly decreases (Alternatives 6B and 6C only).
  - Along the I-710 freeway (including the freight corridor, if applicable), only Alternative 6B and Alternative 6C show decreases in emissions (mostly NO_x and ROG) compared to Alternative 1 (No-Build). Otherwise, all build alternatives have increased emissions along the I-710 freeway compared to Alternative 1, with the greatest increases for Alternative 6A and then Alternative 5A.
- Entrained PM_{10} and $PM_{2.5}$ emissions increase for all alternatives (compared to 2008) and in all study areas. These increases can be greater than the calculated incremental exhaust emission decreases, leading to the conclusion that total PM_{10} emissions increase in all study areas for 2035 project alternatives (and I-710 freeway $PM_{2.5}$ emissions for Alternative 5A) compared to 2008.
  - After the I-710 Corridor Project emission calculations were completed, SCAQMD has proposed a modified methodology for entrained PM emissions as part of their 2012 AQMP development. In SCAQMD's proposed methodology, 2008 PM_{10} and $PM_{2.5}$ estimates will be lower, particularly $PM_{2.5}$ estimates. Most importantly, future year entrained PM will remain constant unless the roadway is lengthened. Thus, actual PM impacts for the project alternatives (compared to the 2008 baseline) will be more similar to the exhaust PM impacts than the results presented for total PM impacts.
- I-710 Freeway Near-Roadway Impacts: All alternatives (compared to 2008 or Alternative 1) showed greater criteria and air toxics emissions impacts along the I-710 freeway than in the I-710 Study AOI or SCAB. This was anticipated, because widening and/or building a freight corridor would attract more traffic to the I-710 freeway and reduce traffic (and emissions) on local roadways and other freeways. An additional dispersion modeling (AERMOD) assessment of near-roadway air quality and health risk impacts along the I-710 freeway was conducted to assess these impacts.

  For near-roadway impacts from I-710 freeway emissions (compared to 2008, unless noted):

- Principally, none[64] of the 2035 alternatives is expected to result in an exceedence of the CAAQS or NAAQS for NO_2 and CO.
- All 2035 alternatives had near-freeway (<300 meters) total PM_{10} and $PM_{2.5}$ impacts, with the least impacts for Alternative 1.
- Alternatives 5A and 6A had incremental exhaust PM_{10} and $PM_{2.5}$ impacts greater than the SCAQMD's significance threshold (although lower impacts than incremental total PM_{10} and $PM_{2.5}$).
- Alternatives 1, 6B and 6C had no incremental exhaust PM_{10} and $PM_{2.5}$ impacts greater than the SCAQMD's significance threshold.[65]
- Compared to 2008, cancer risk and hazard indices decrease throughout the modeling domain for all 2035 alternatives except Alternative 6A in non-residential areas very near to the I-710 (mainline and/or freight corridor).
- Compared to Alternative 1, Alternative 6B and Alternative 6C have lower cancer risk impacts until the freight corridor ends near the railyards, while the other alternatives have greater cancer risk impacts. Cancer risk impacts north of Washington Boulevard are greater for all build alternatives (compared to Alternative 1), even for Alternatives 6B and 6C, because it is assumed that trucks not on the freight corridor do not have zero-emission technologies.

• The greatest GHG reductions (compared to Alternative 1) occurred for Alternatives 6B and 6C with decreases of 600,000 and 490,000 $MTCO_2e$/year, respectively.

• $PM_{2.5}$ Mortality/Morbidity and Ultrafine Particulates
  - Special I-710 Corridor Project qualitative analyses were conducted for $PM_{2.5}$ mortality/morbidity and ultrafine particulates, using total $PM_{2.5}$ and exhaust $PM_{2.5}$ impacts, respectively, as surrogates. Details can be found in Section 4.5 and 4.6, respectively.
  - The public's exposure to PM-related morbidity and mortality health risks would generally decrease relative to the 2008 baseline in all parts of the I-710 Study Area of Interest; the exceptions would be some locations near portions of the I-710 freeway and/or freight corridor (<100 meters).
  - The public's exposure to ultrafine particulates should decrease for all 2035 Alternatives relative to the 2008 baseline, with the greatest decreases further from the I-710 freeway and decreases at most locations near the I-710 freeway (and freight corridor, if applicable).
  - Alternatives 6B and 6C had the lowest exhaust $PM_{2.5}$ emissions and modeled concentration impacts of all 2035 alternatives (even 2035 Alternative 1).

[64] The exceedence of the NO_2 CAAQS at one grid receptor less than 10 meters from the freight corridor for Alternative 6A should be considered in light of the model's ability to calculate impacts that close to the source.
[65] For annual average PM_{10}, there were 6 or fewer model receptor grids right next to the freeway that showed increases above the SCAQMD's significance threshold for Alternatives 6B and 6C, compared to 2008.

- Regional and Project-Level Conformity
  - Regional and project-level conformity with state and national conformity requirements was conducted. Details can be found in Sections ES.10, 4.7, 4.8, and Appendices H and I. The I-710 Corridor Project is expected to demonstrate conformity with all state and national conformity requirements.

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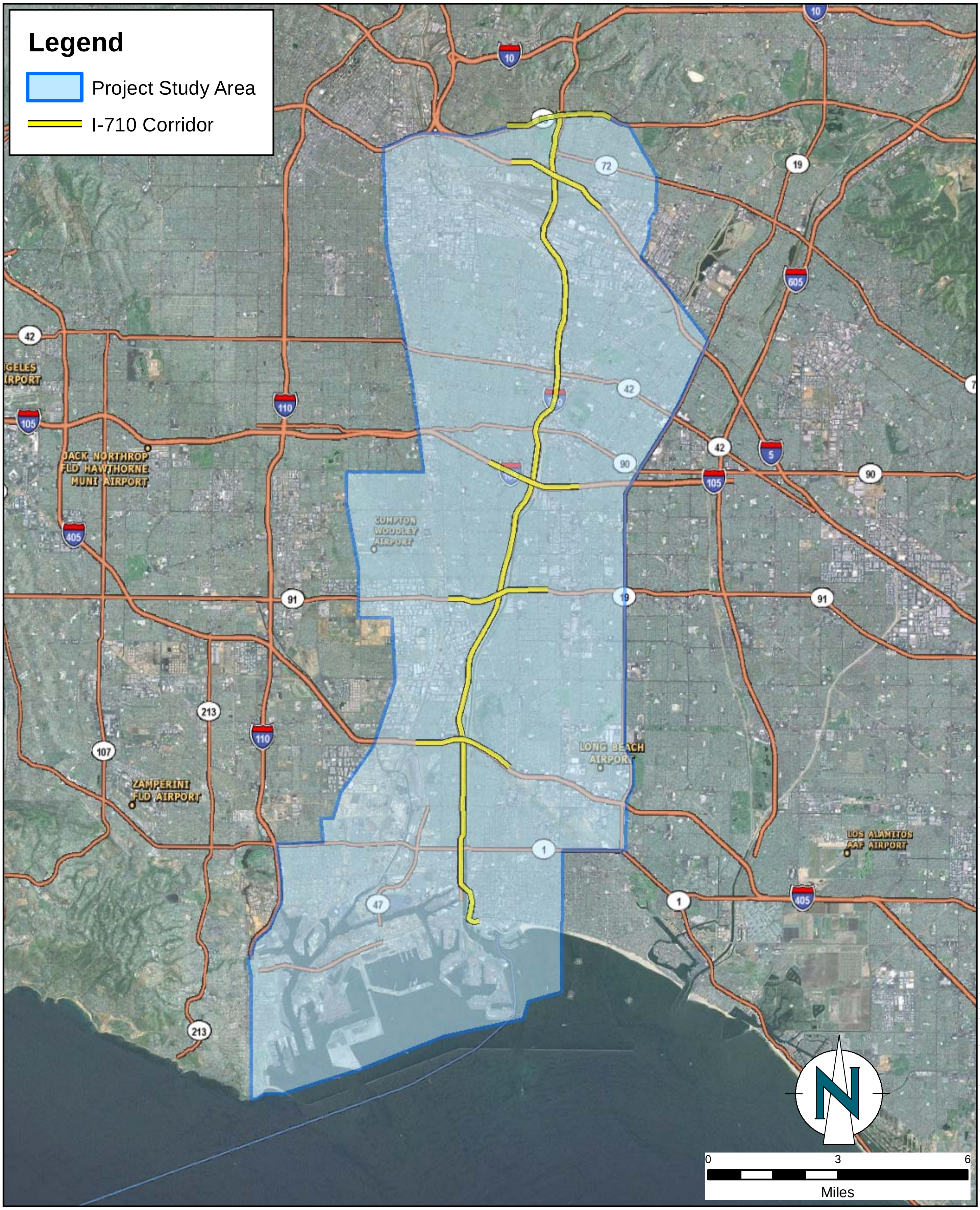

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Project Study Area

Figure 1.1A

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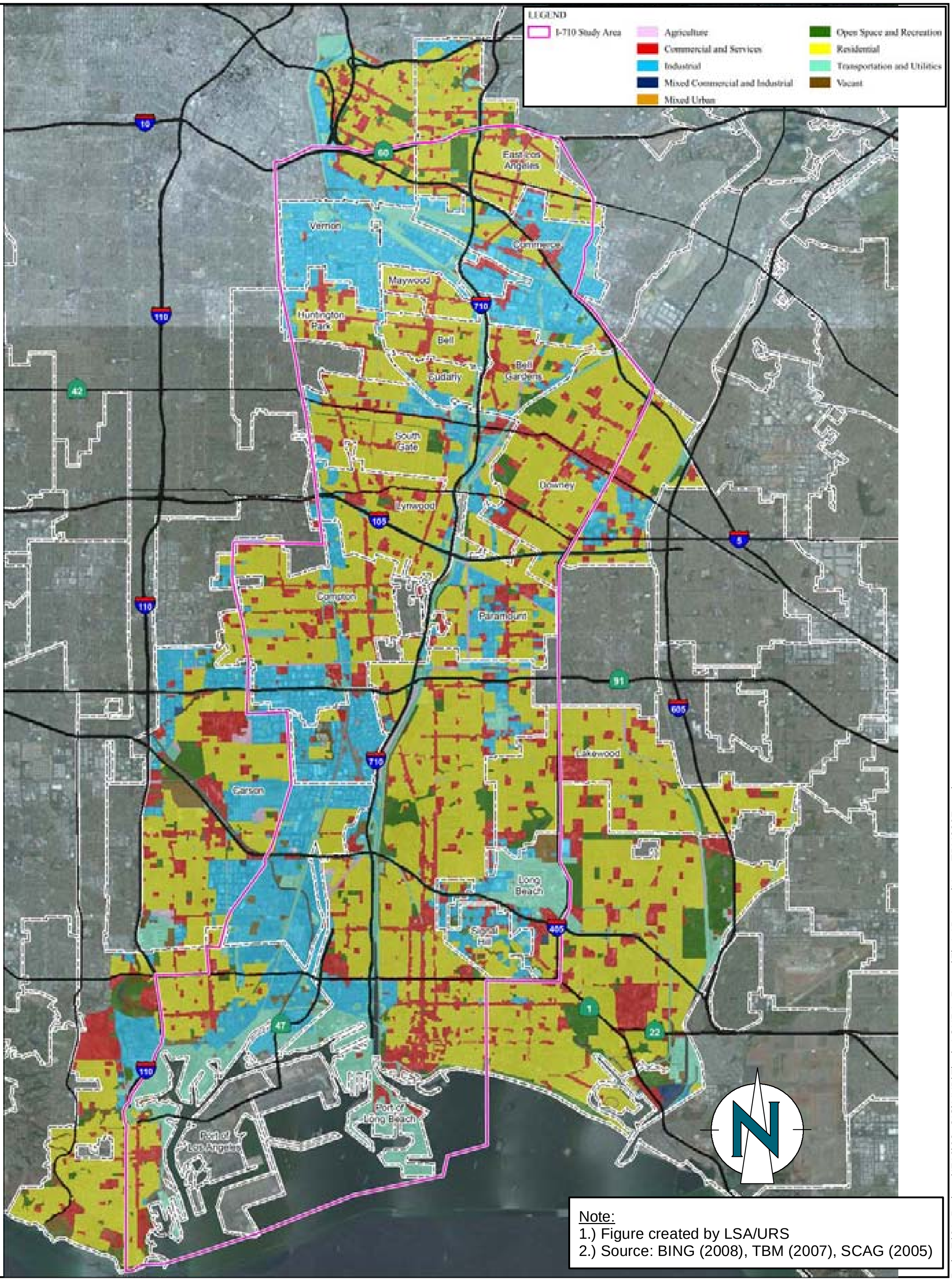

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I-710 Corridor Project Existing Land Use

Figure 1.1B

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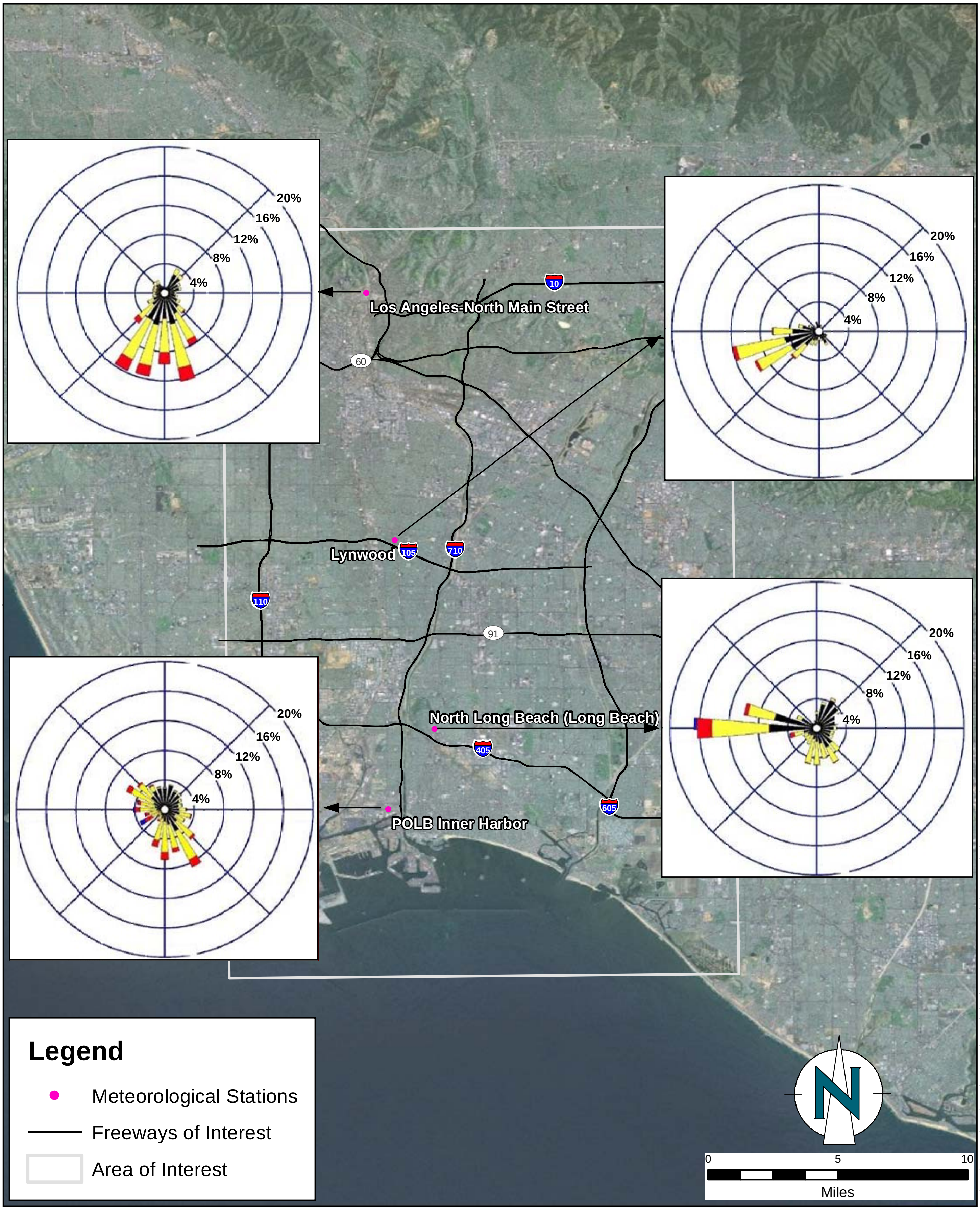

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Wind Roses
for Four Representative
Meteorological Stations

Figure
3.1

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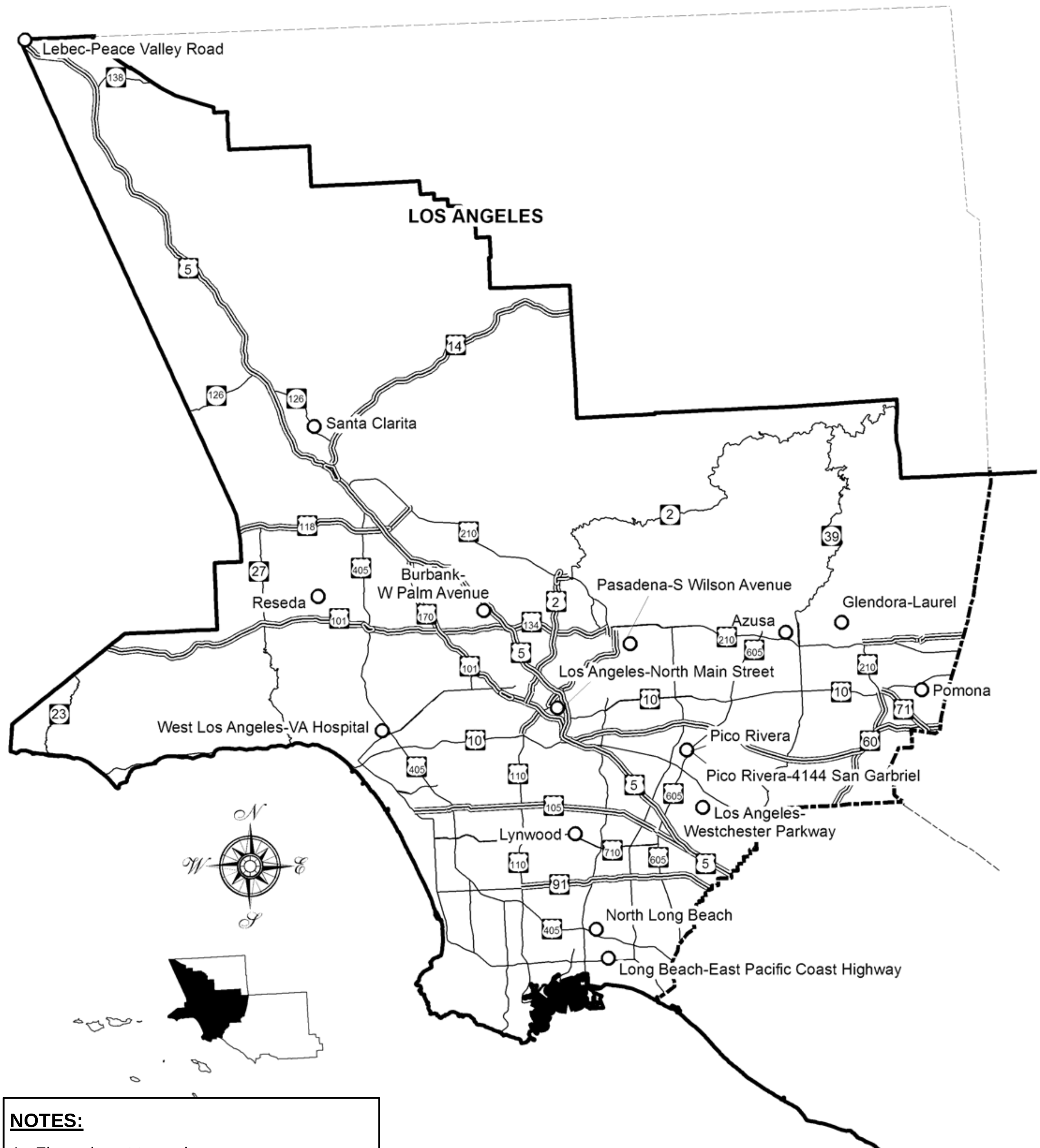

NOTES:

1. Figure is not to scale
2. Figure courtesy of California Air Resource Board, retrieved from website: http://www.arb.ca.gov/aqd/netrpt/netrpt.htm

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South Coast Air Basin Monitoring Stations in the Southern Part of Los Angeles County

Figure 3.2

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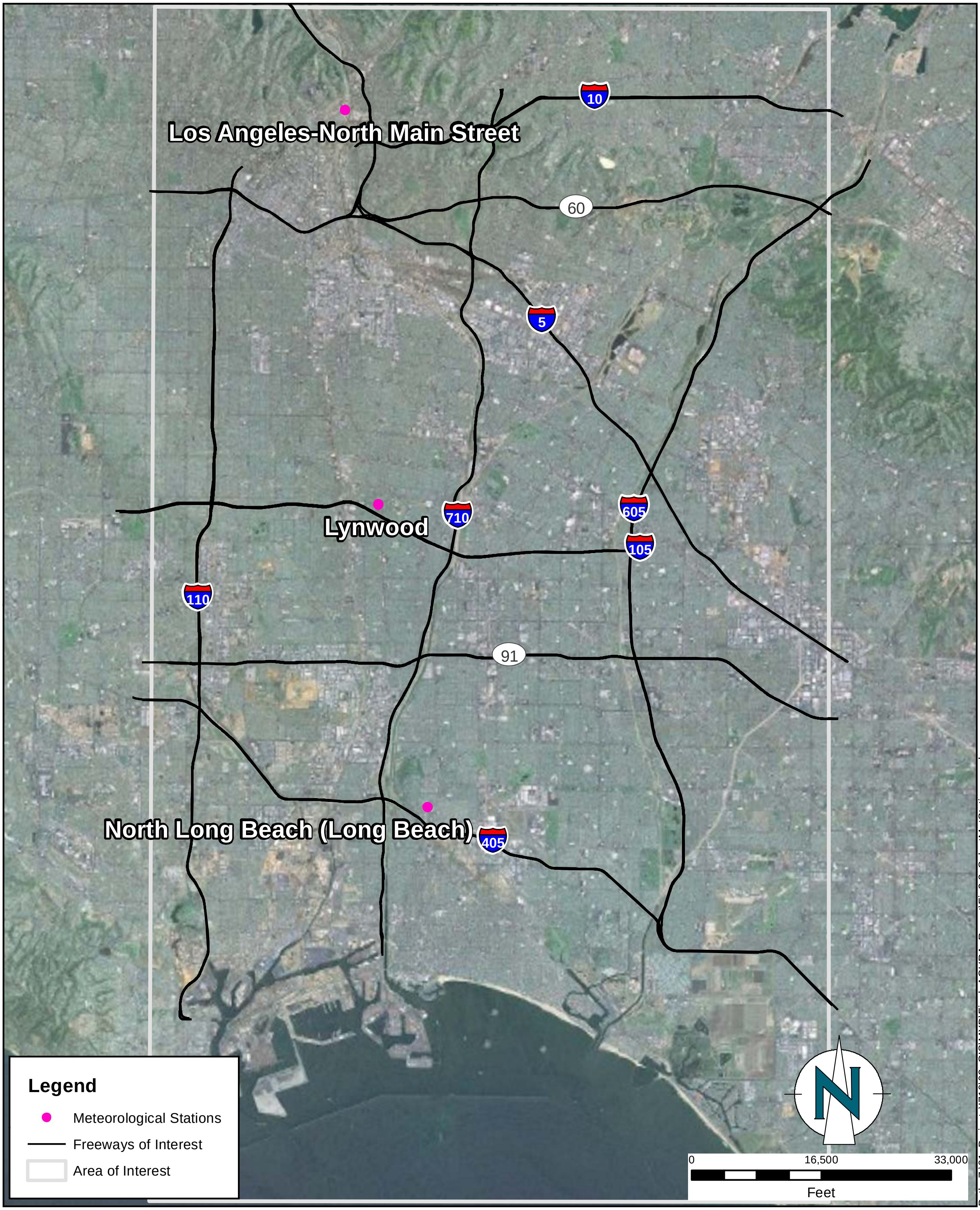

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Location of the North Long Beach, Lynwood, and Los Angeles-North Main Street Monitors within the I-710 Project Area of Interest

Figure 3.3

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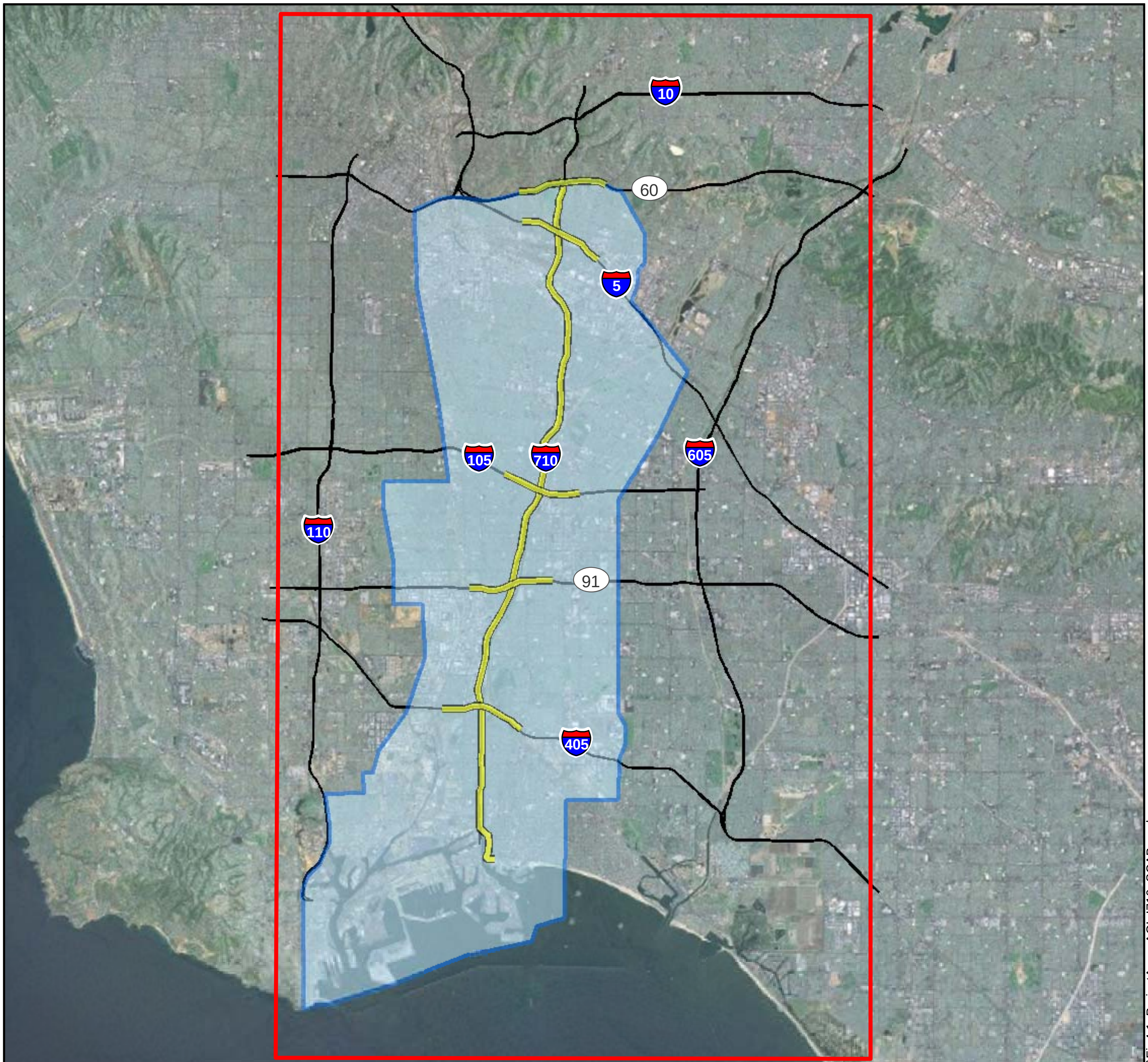

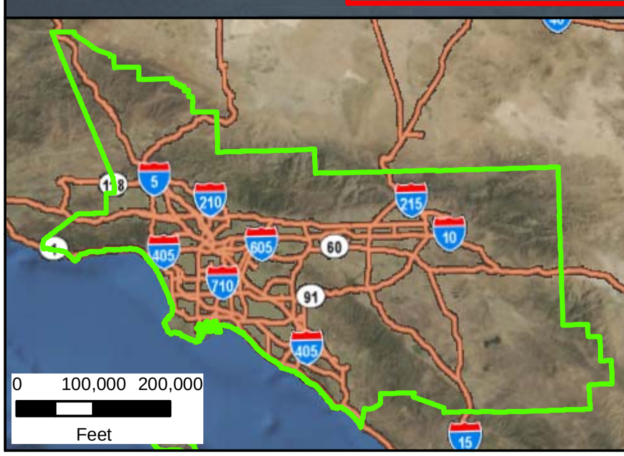

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Legend

- Area of Interest
- I-710 Corridor
- Project Study Area
- Freeways of Interest
- South Coast Air Basin

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Project Study Area within Area of Interest

Figure 4.1

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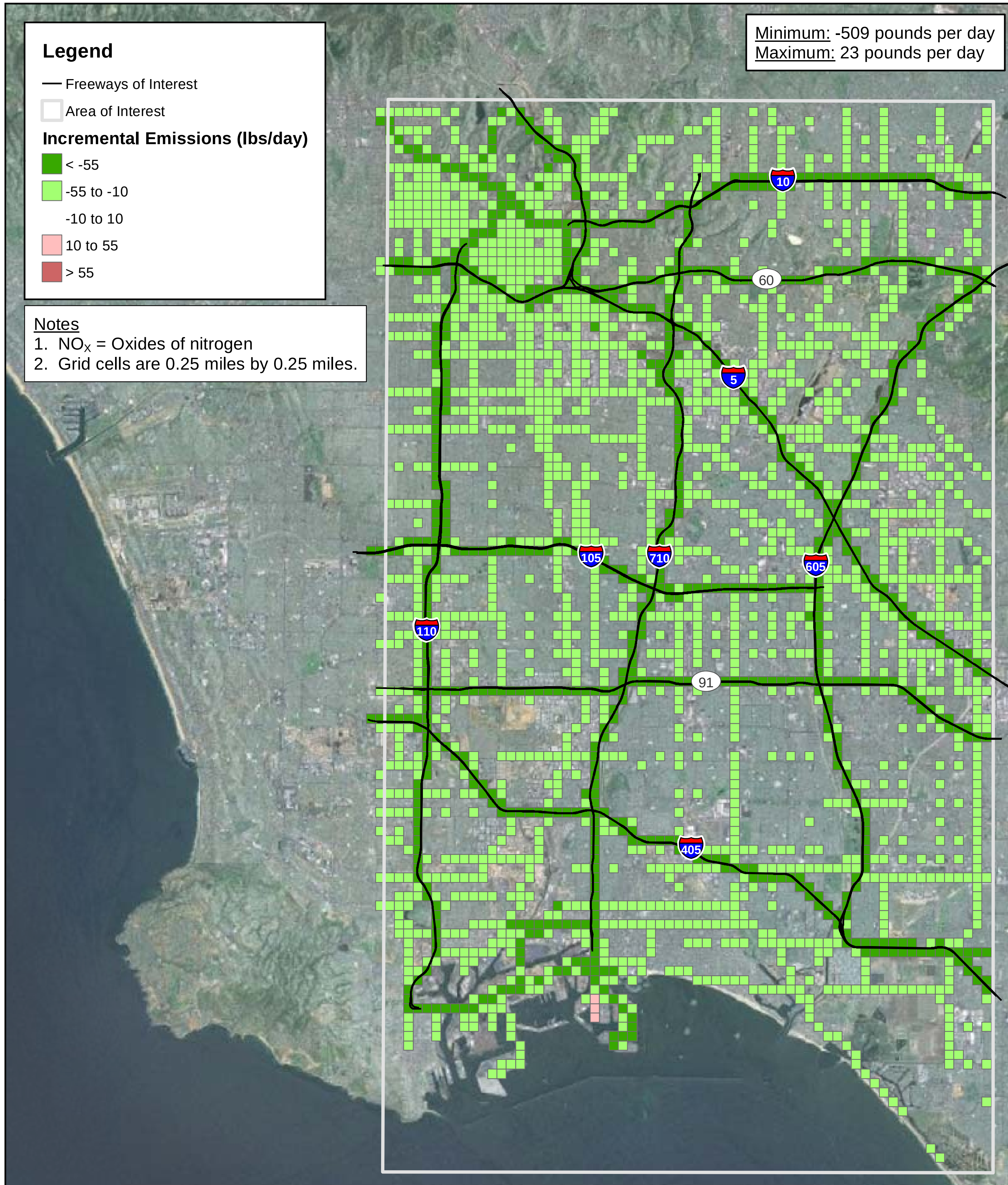

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Comparison of 2035 Alternative 1 to 2008 Baseline NO_X Emissions

Figure 4.2

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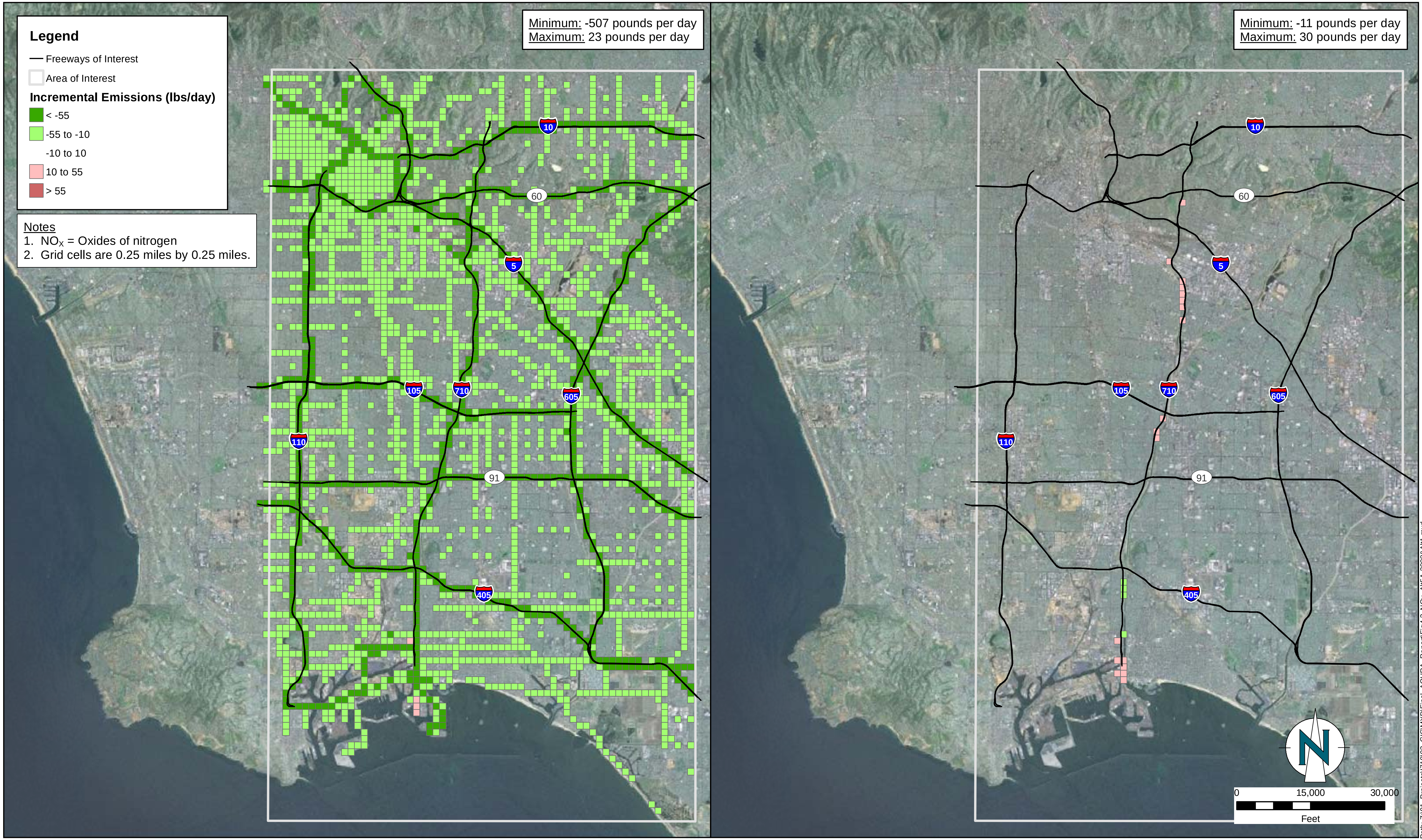

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Comparison of
2035 Alternative 5A to 2008 Baseline
NO_X Emissions

Comparison of
2035 Alternative 5A to 2035 Alternative 1
NO_X Emissions

Figure
4.3

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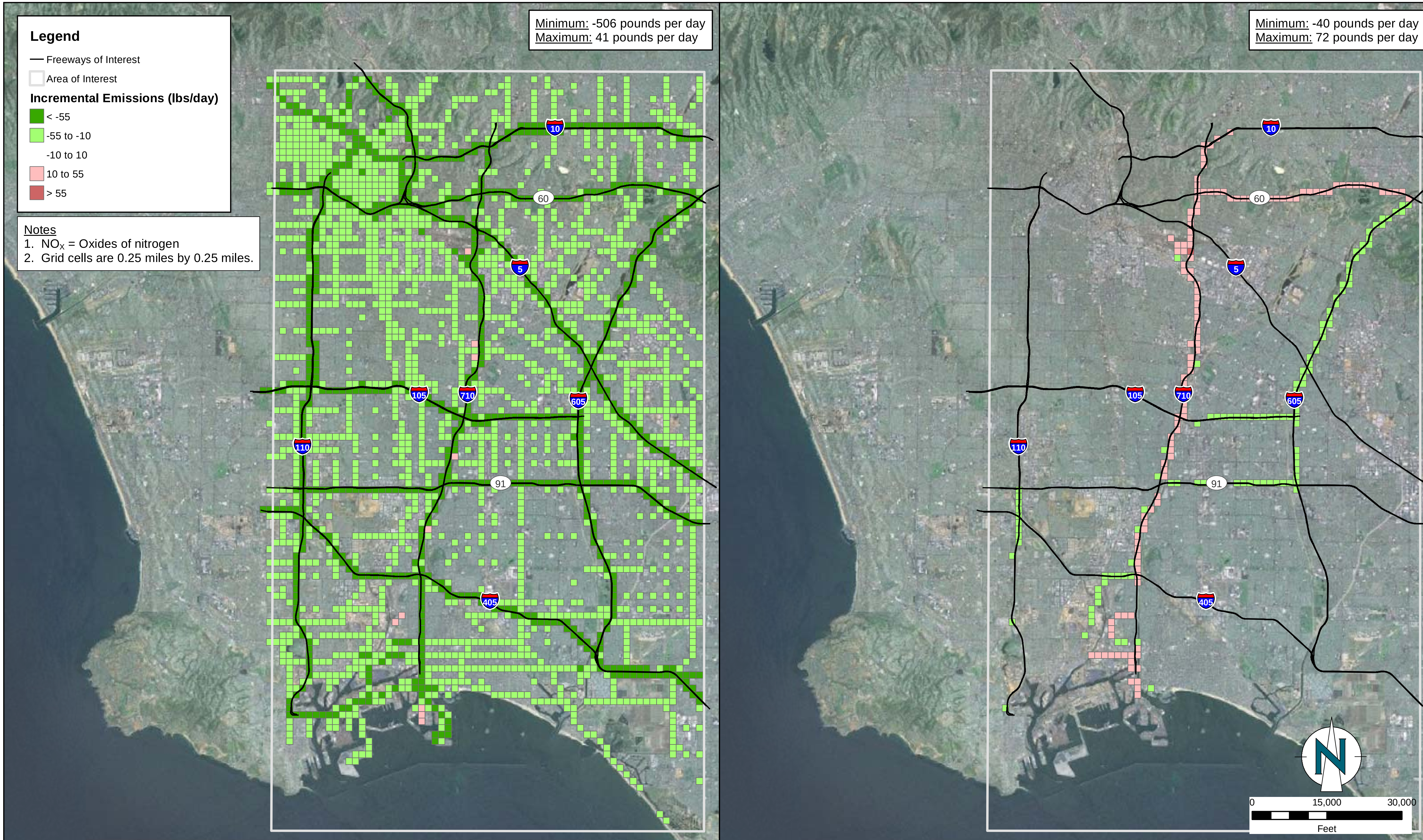

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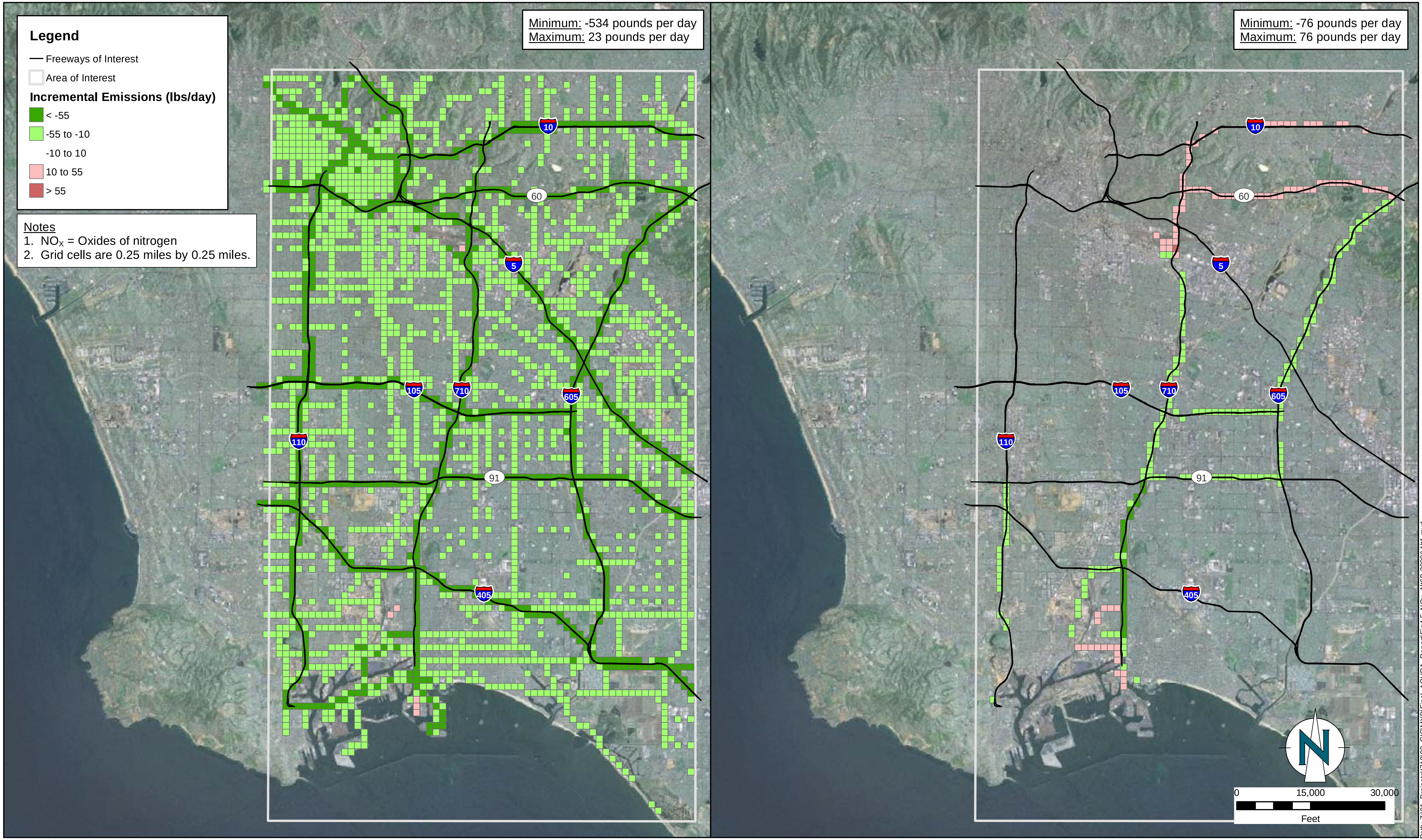
Comparison of
2035 Alternative 6A to 2008 Baseline
NO_X Emissions

Comparison of
2035 Alternative 6A to 2035 Alternative 1
NO_X Emissions

Figure
4.4

PROJECT: 05-18574E4



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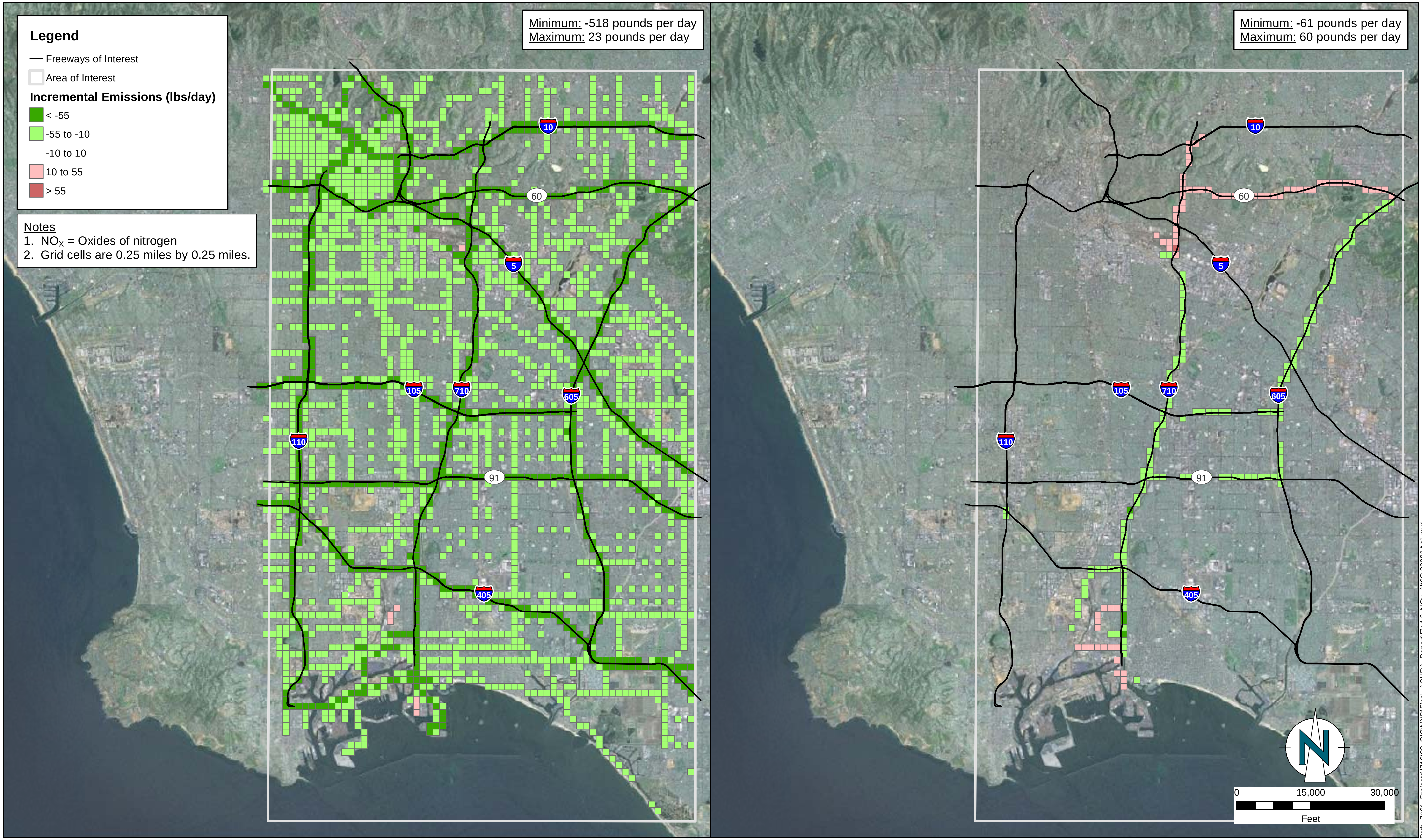
Comparison of 2035 Alternative 6B to 2008 Baseline NO_X Emissions

Comparison of 2035 Alternative 6B to 2035 Alternative 1 NO_X Emissions

Figure 4.5

PROJECT: 05-18574E4



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Comparison of
2035 Alternative 6C to 2008 Baseline
NO_X Emissions

Comparison of
2035 Alternative 6C to 2035 Alternative 1
NO_X Emissions

Figure
4.6

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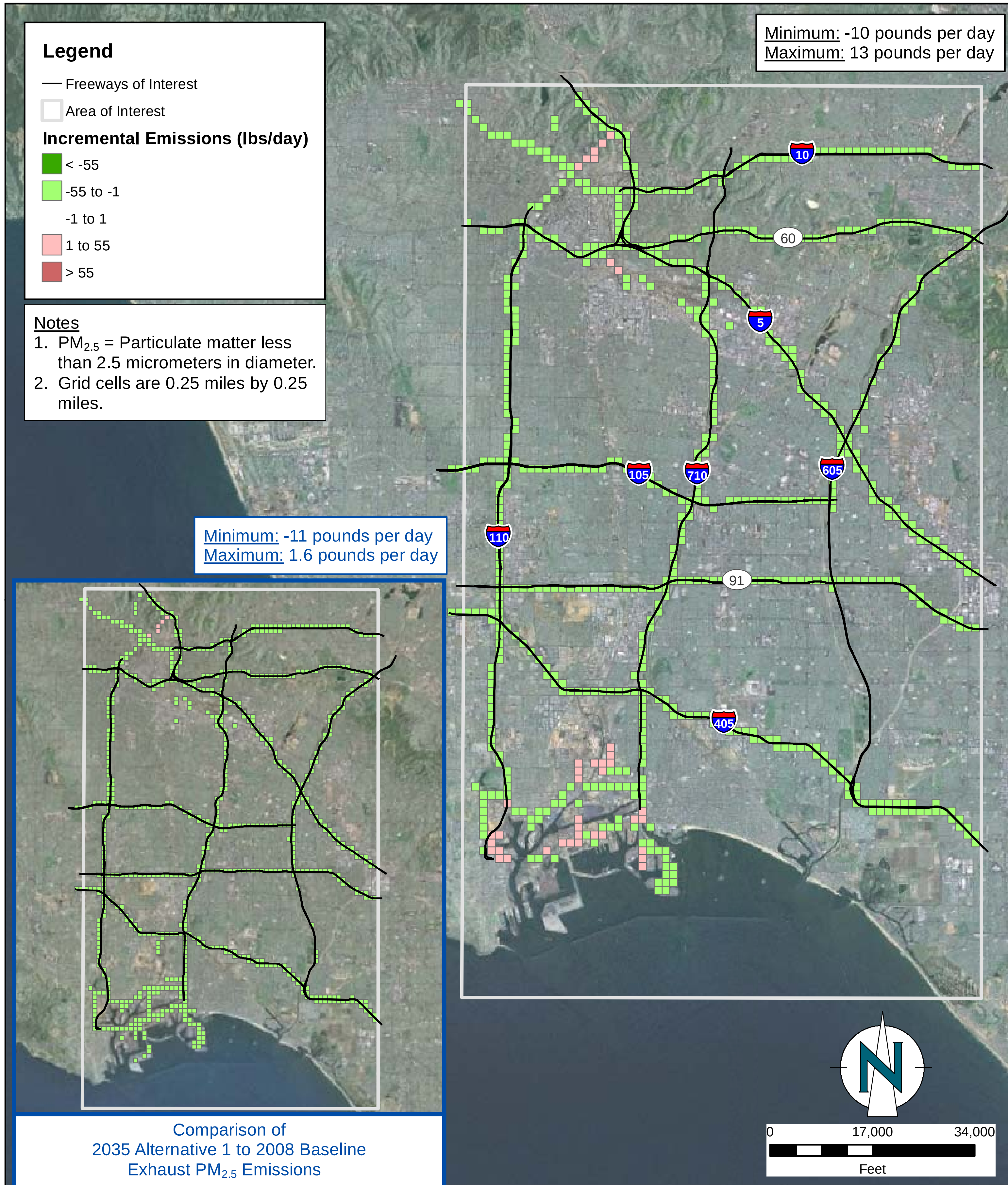

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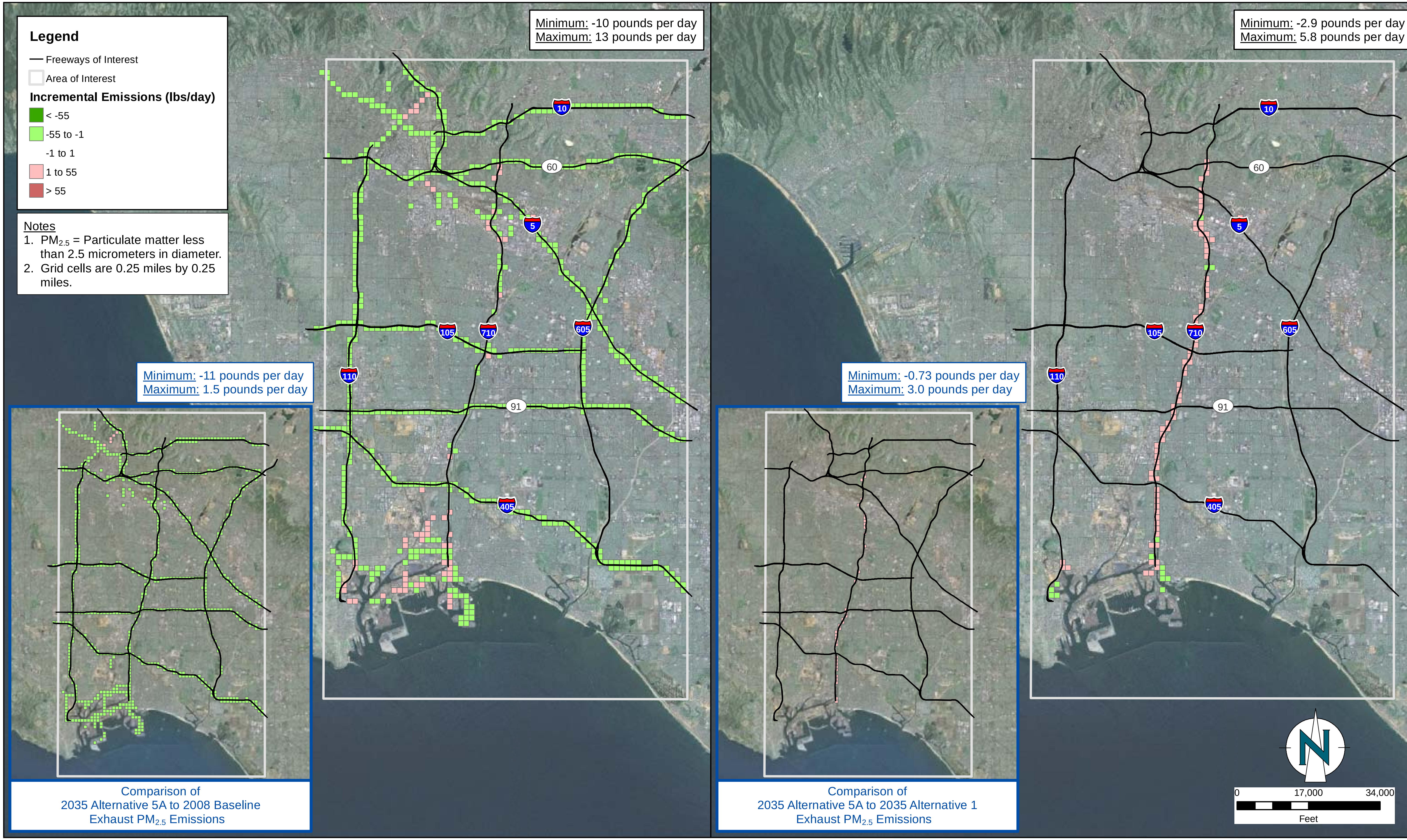
Comparison of
2035 Alternative 1 to 2008 Baseline
Total $PM_{2.5}$ Emissions

Figure
4.7

PROJECT: 05-18574E4



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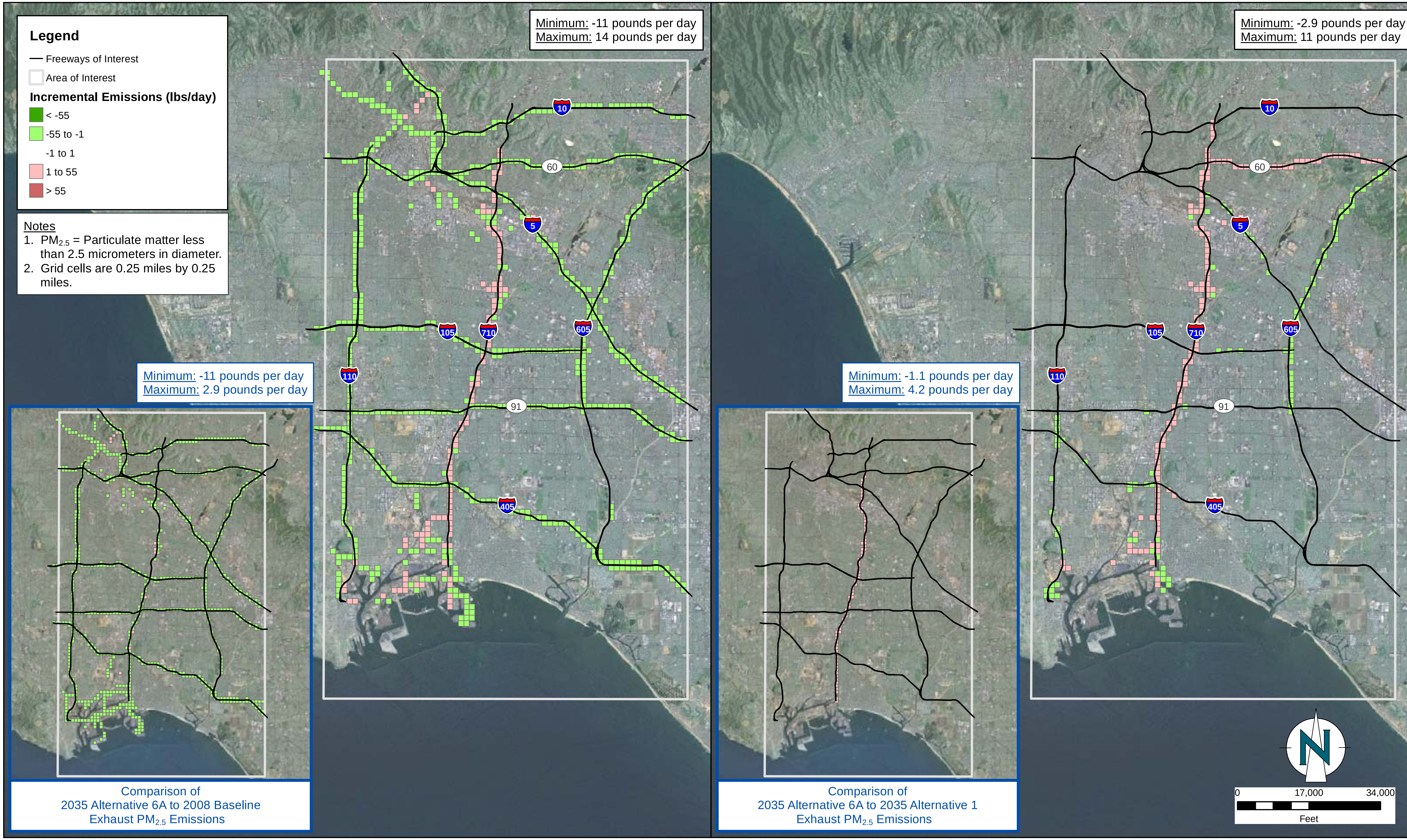
Comparison of
2035 Alternative 5A to 2008 Baseline
Total $PM_{2.5}$ Emissions

Comparison of
2035 Alternative 5A to 2035 Alternative 1
Total $PM_{2.5}$ Emissions

Figure
4.8

PROJECT: 05-18574E4



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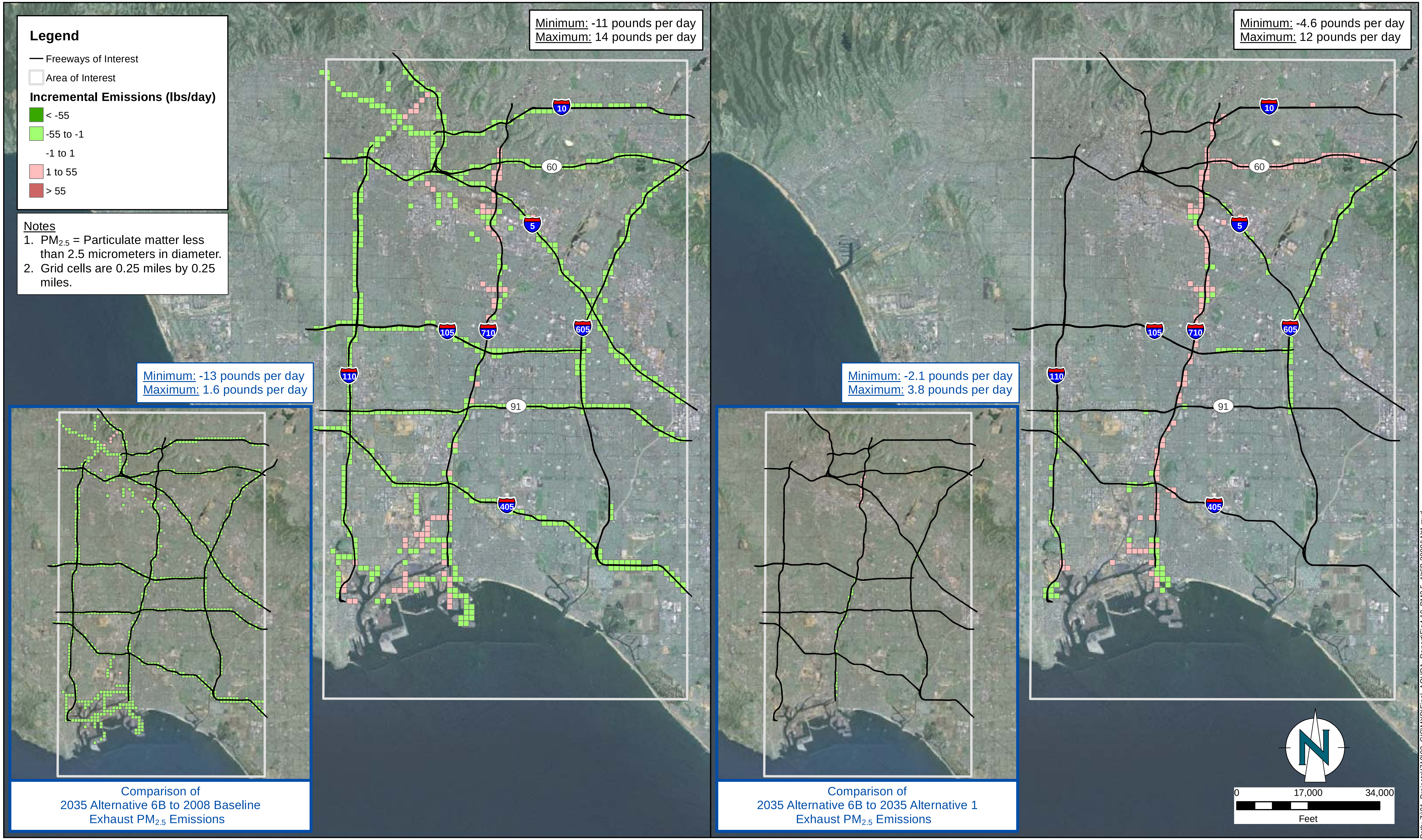
Comparison of
2035 Alternative 6A to 2008 Baseline
Total $PM_{2.5}$ Emissions

Comparison of
2035 Alternative 6A to 2035 Alternative 1
Total $PM_{2.5}$ Emissions

Figure
4.9

PROJECT: 05-18574E4



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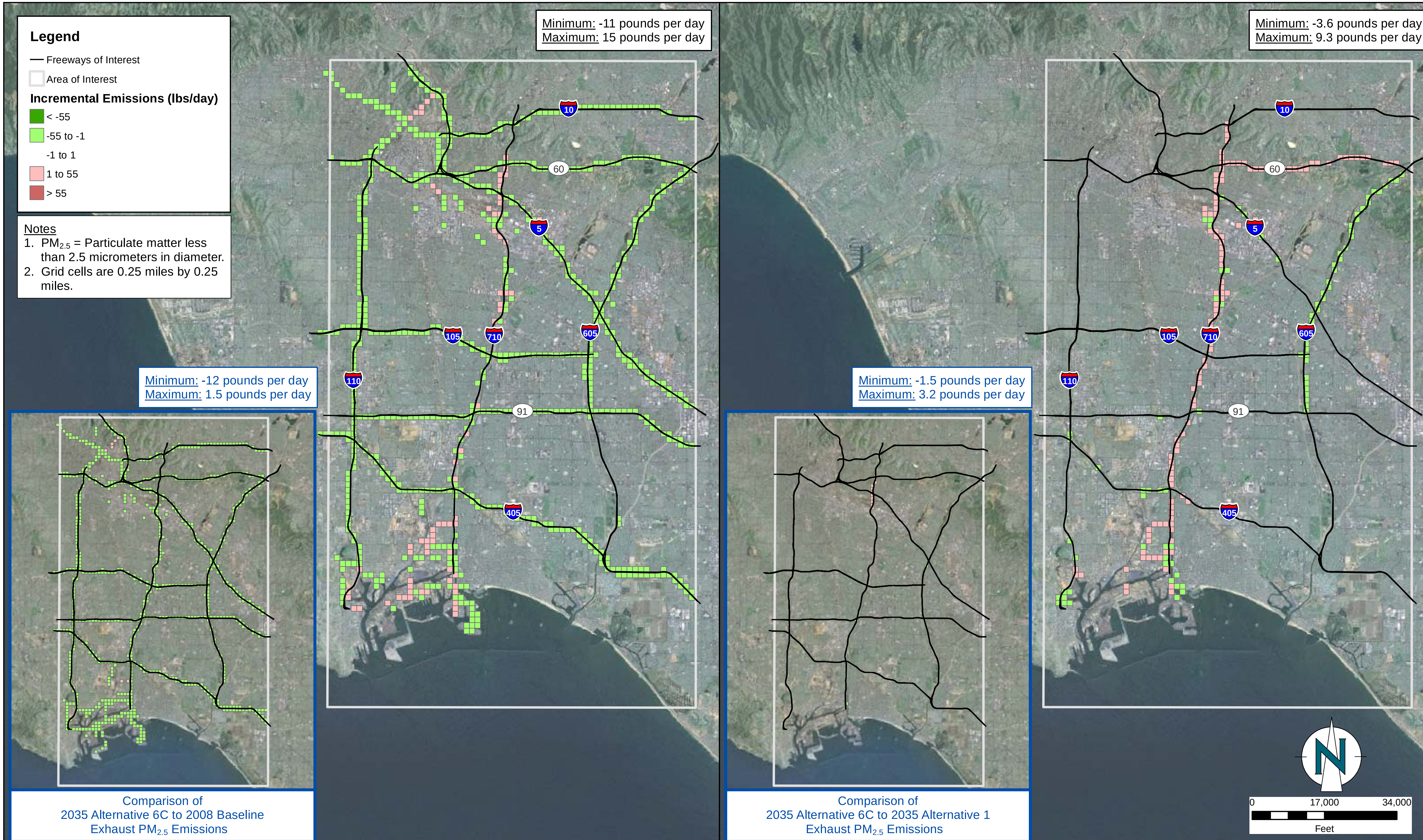
Comparison of
2035 Alternative 6B to 2008 Baseline
Total $PM_{2.5}$ Emissions

Comparison of
2035 Alternative 6B to 2035 Alternative 1
Total $PM_{2.5}$ Emissions

Figure
4.10

PROJECT: 05-18574E4



ENVIRON	Comparison of 2035 Alternative 6C to 2008 Baseline Total $PM_{2.5}$ Emissions	Comparison of 2035 Alternative 6C to 2035 Alternative 1 Total $PM_{2.5}$ Emissions	Figure 4.11
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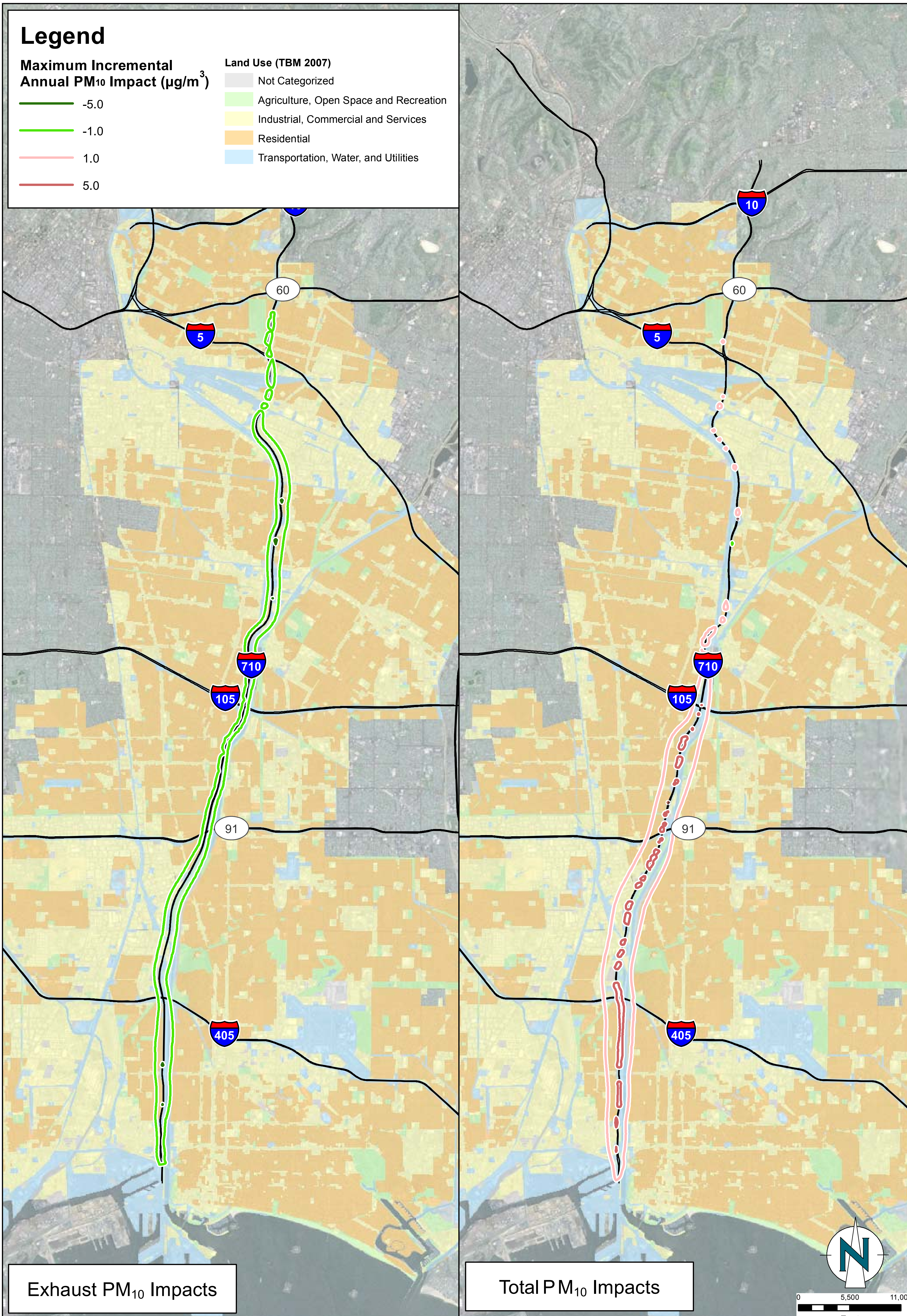

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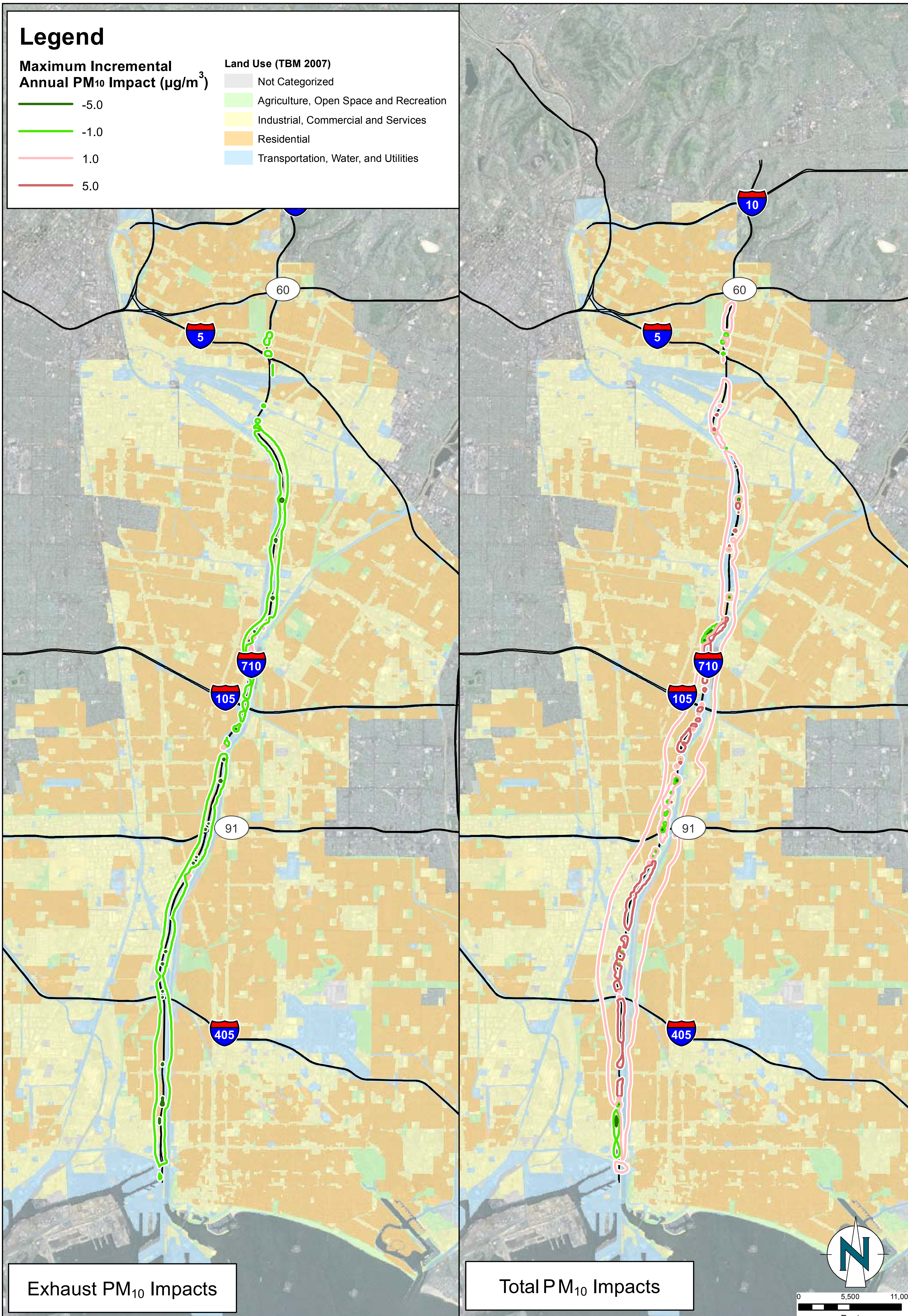
Comparison of 2035 Alternative 1 to 2008 Baseline Maximum Incremental Annual PM_{10} Impacts

Figure 4.12

PROJECT: 05-18574E4



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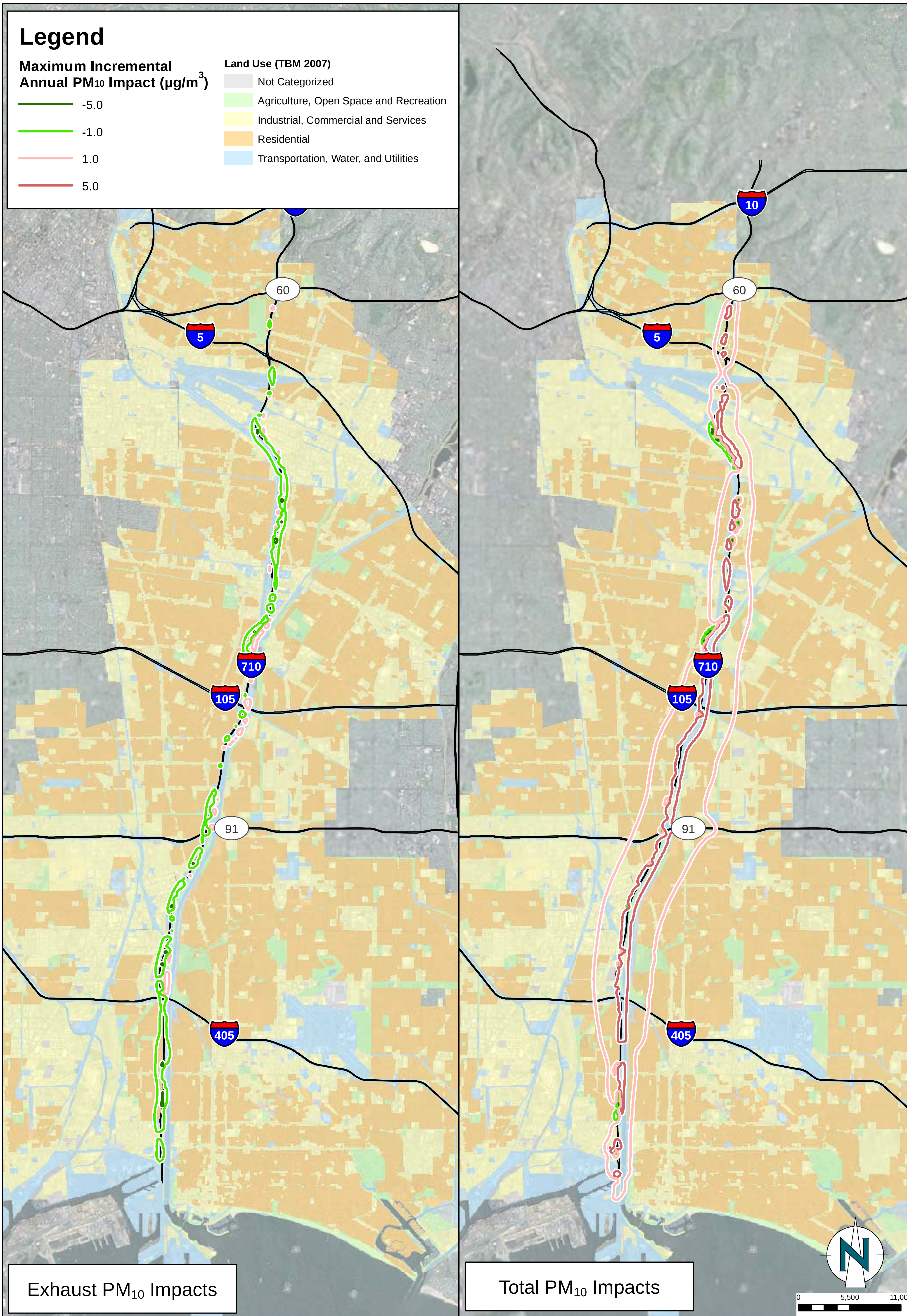
Comparison of
2035 Alternative 5A to 2008 Baseline
Maximum Incremental Annual PM_{10} Impacts

Figure
4.13

PROJECT: 05-18574E4



ENVIRON

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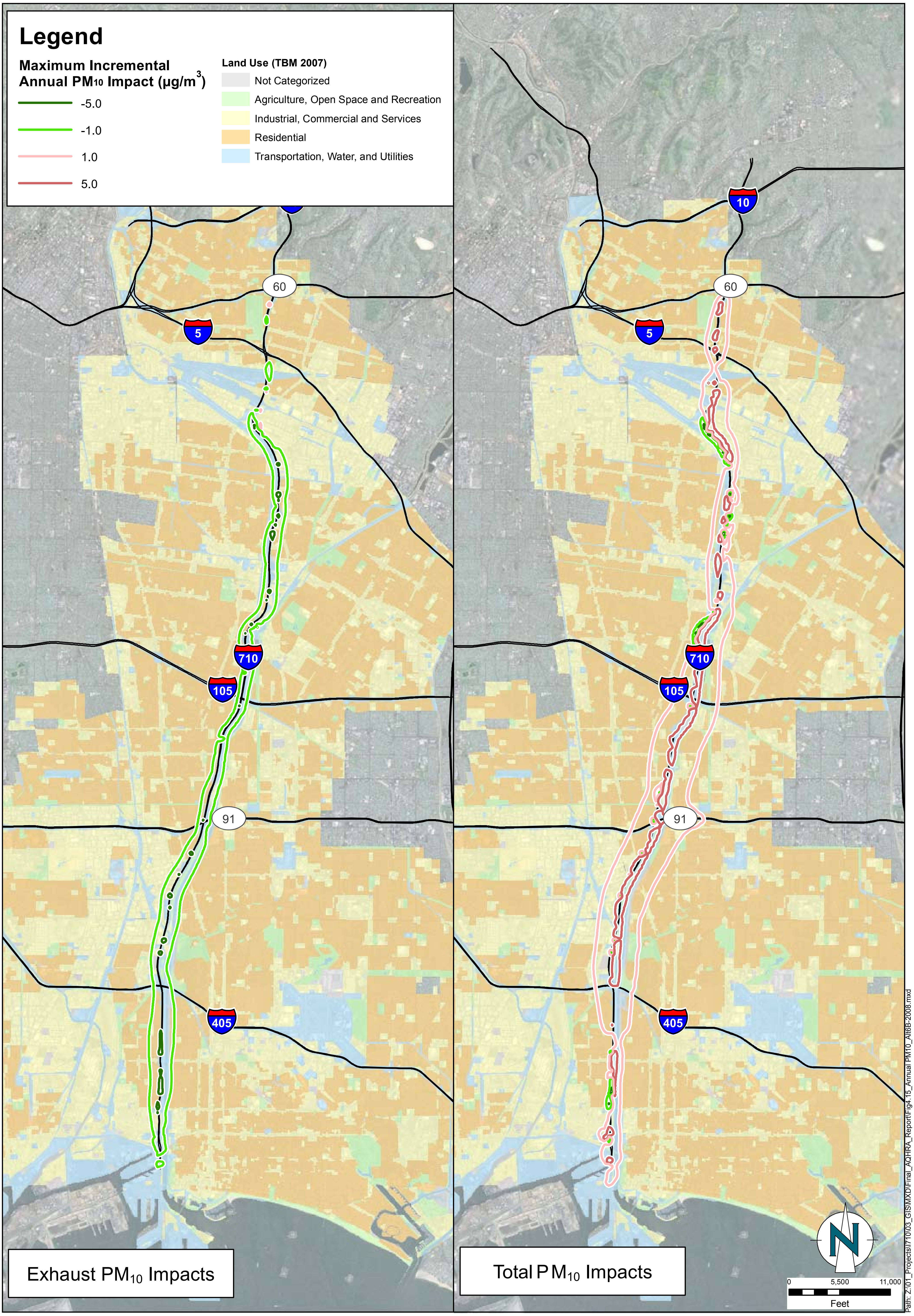
Comparison of 2035 Alternative 6A to 2008 Baseline Maximum Incremental Annual PM_{10} Impacts

Figure 4.14

PROJECT: 05-18574E4



ENVIRON

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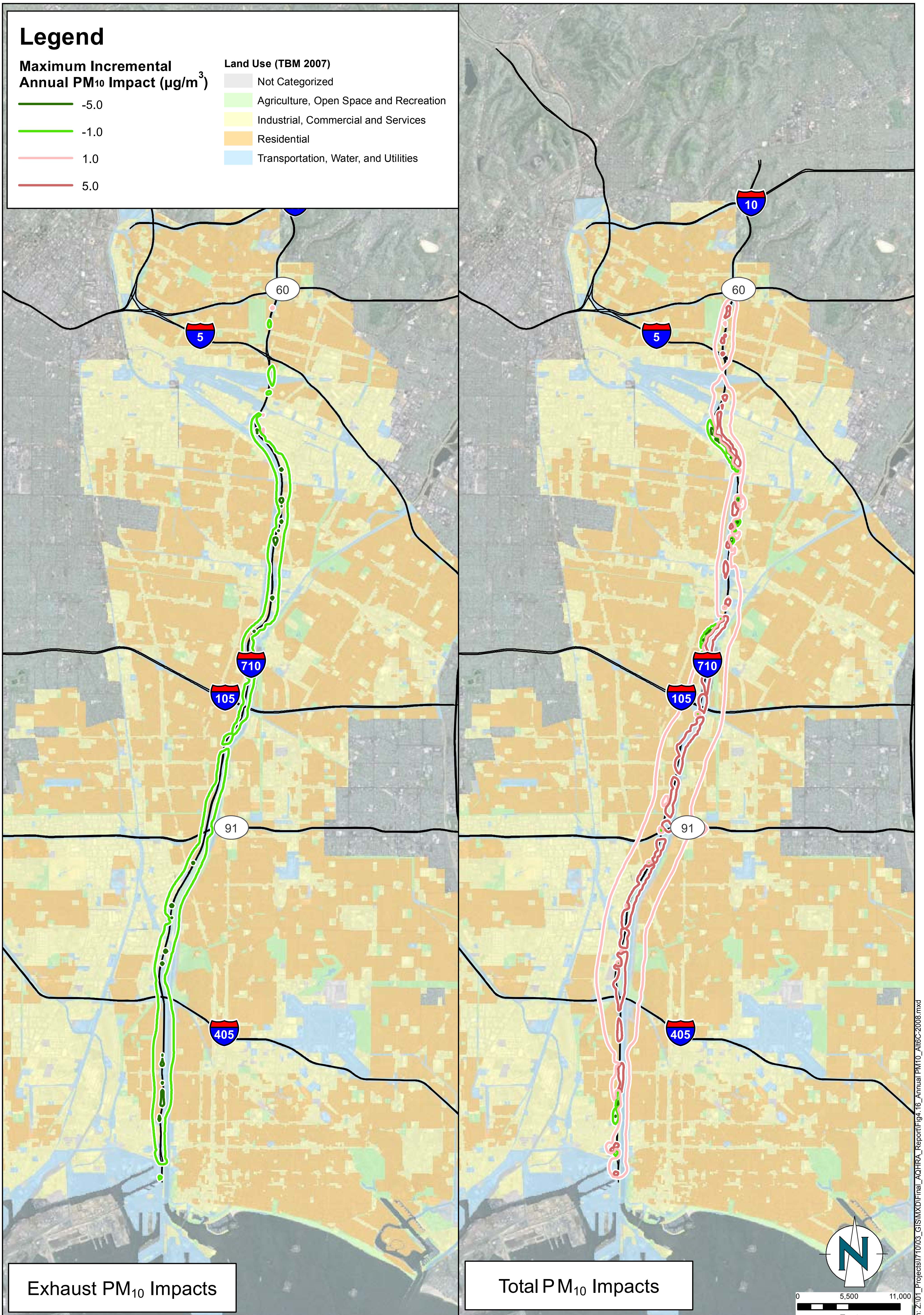
Comparison of
2035 Alternative 6B to 2008 Baseline
Maximum Incremental Annual PM_{10} Impacts

Figure 4.15

PROJECT: 05-18574E4



ENVIRON

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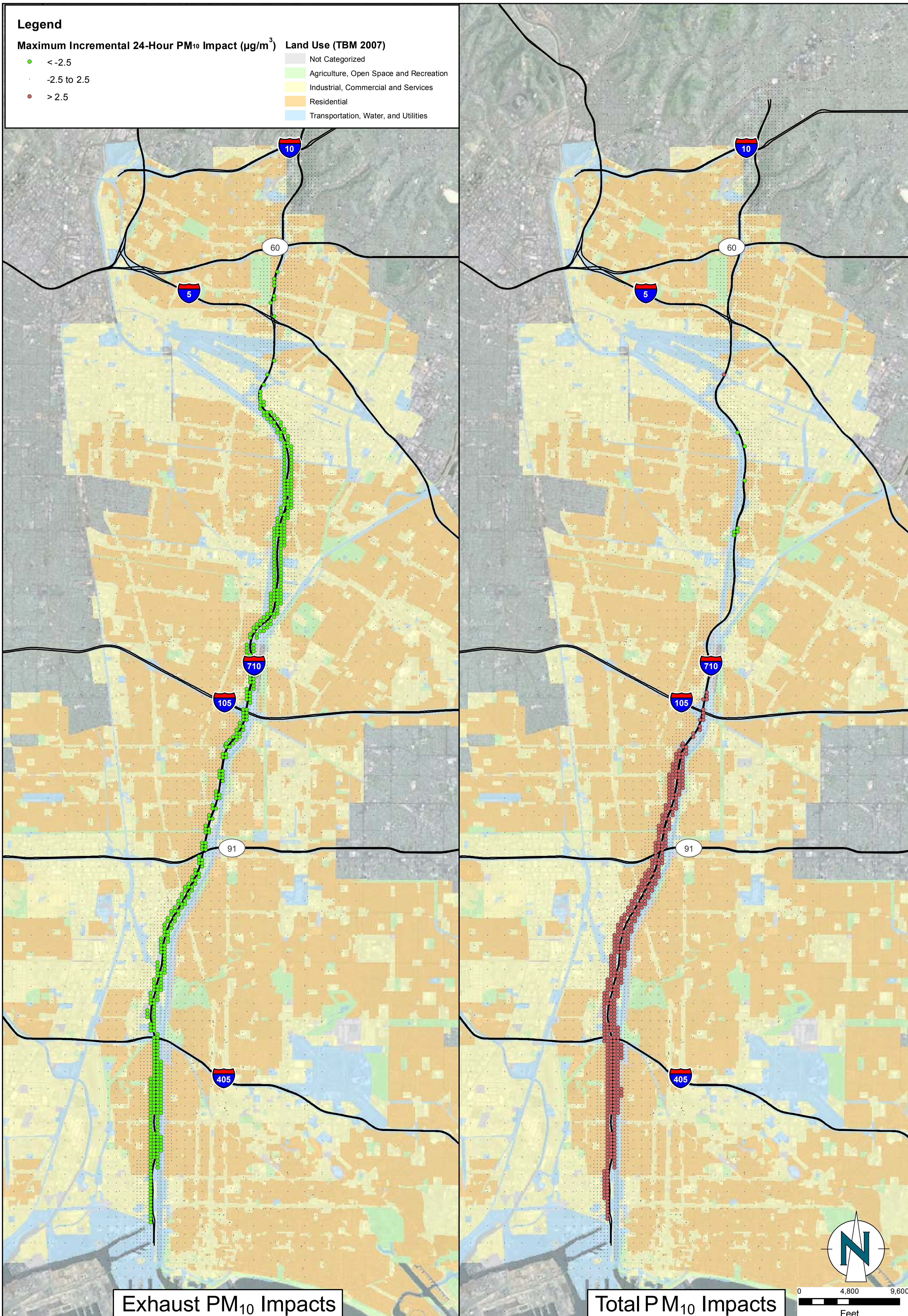
Comparison of
2035 Alternative 6C to 2008 Baseline
Maximum Incremental Annual PM_{10} Impacts

Figure
4.16

PROJECT: 05-18574E4



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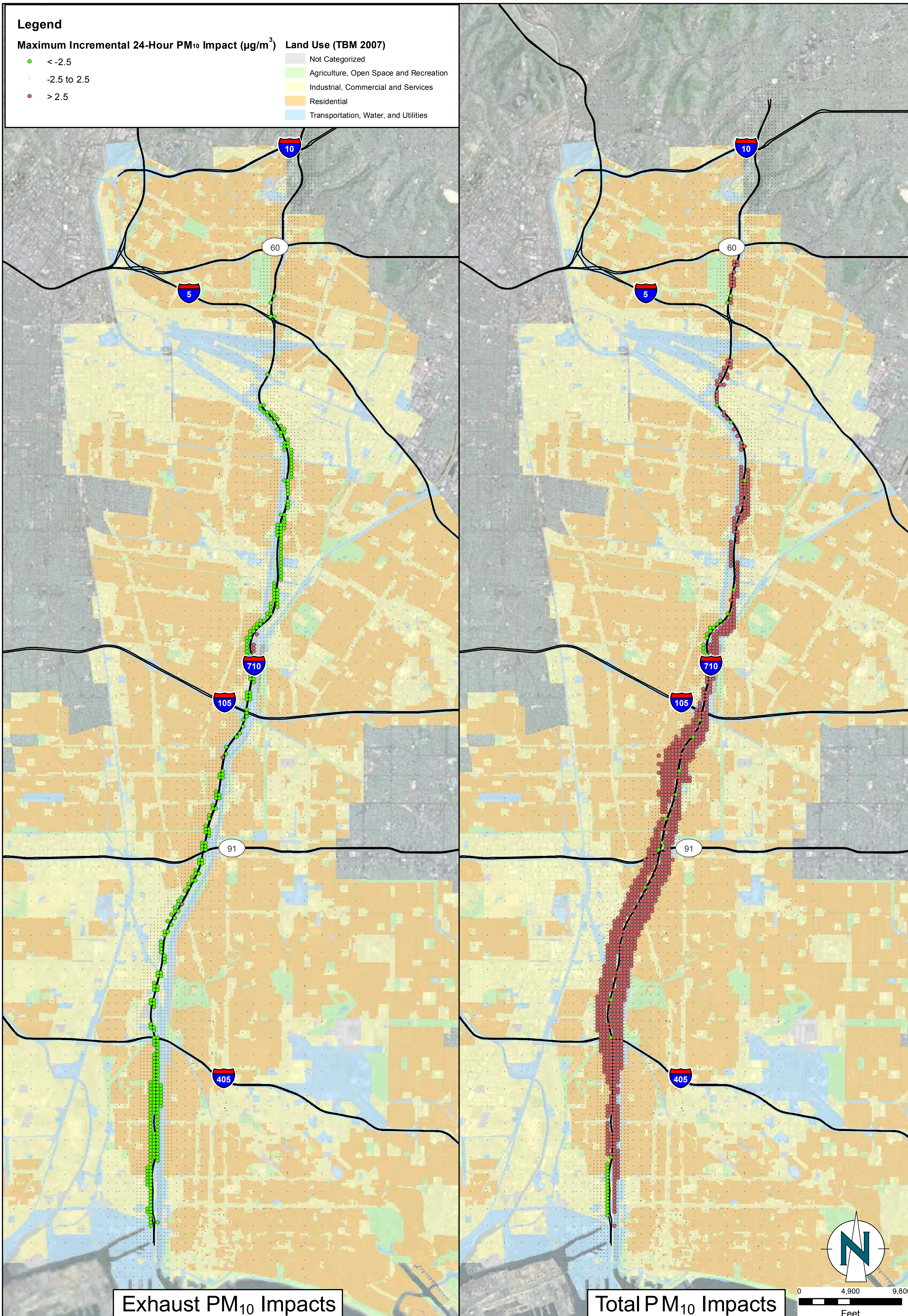
ENVIRON	Comparison of 2035 Alternative 1 to 2008 Baseline Maximum Incremental 24-Hour PM_{10} Impacts	Figure 4.17
DRAFTED BY: MMM · Date: 1/26/2012		PROJECT: 05-18574E4



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ENVIRON

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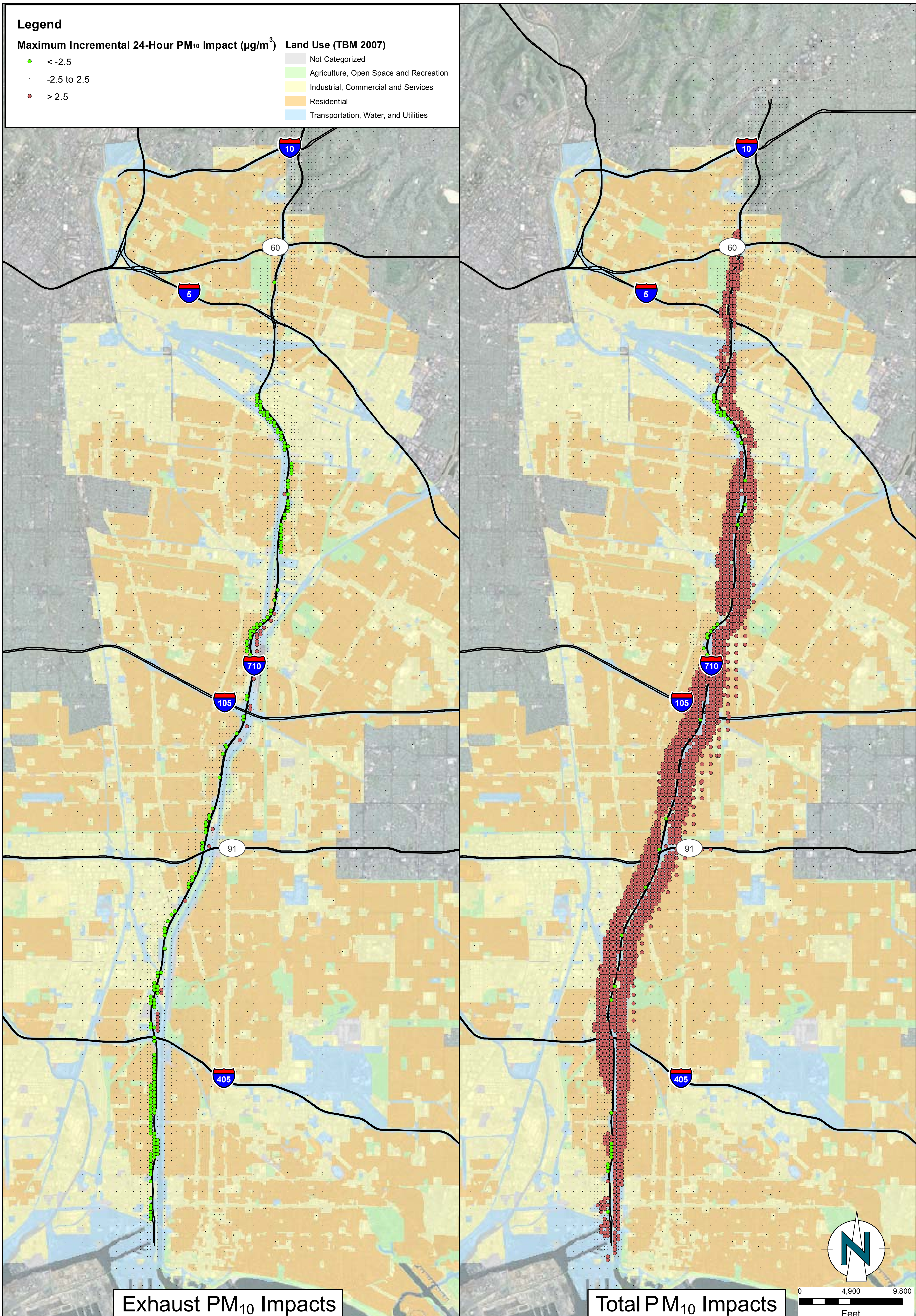
Comparison of
2035 Alternative 5A to 2008 Baseline
Maximum Incremental 24-Hour PM_{10} Impacts

Figure
4.18

PROJECT: 05-18574E4



ENVIRON

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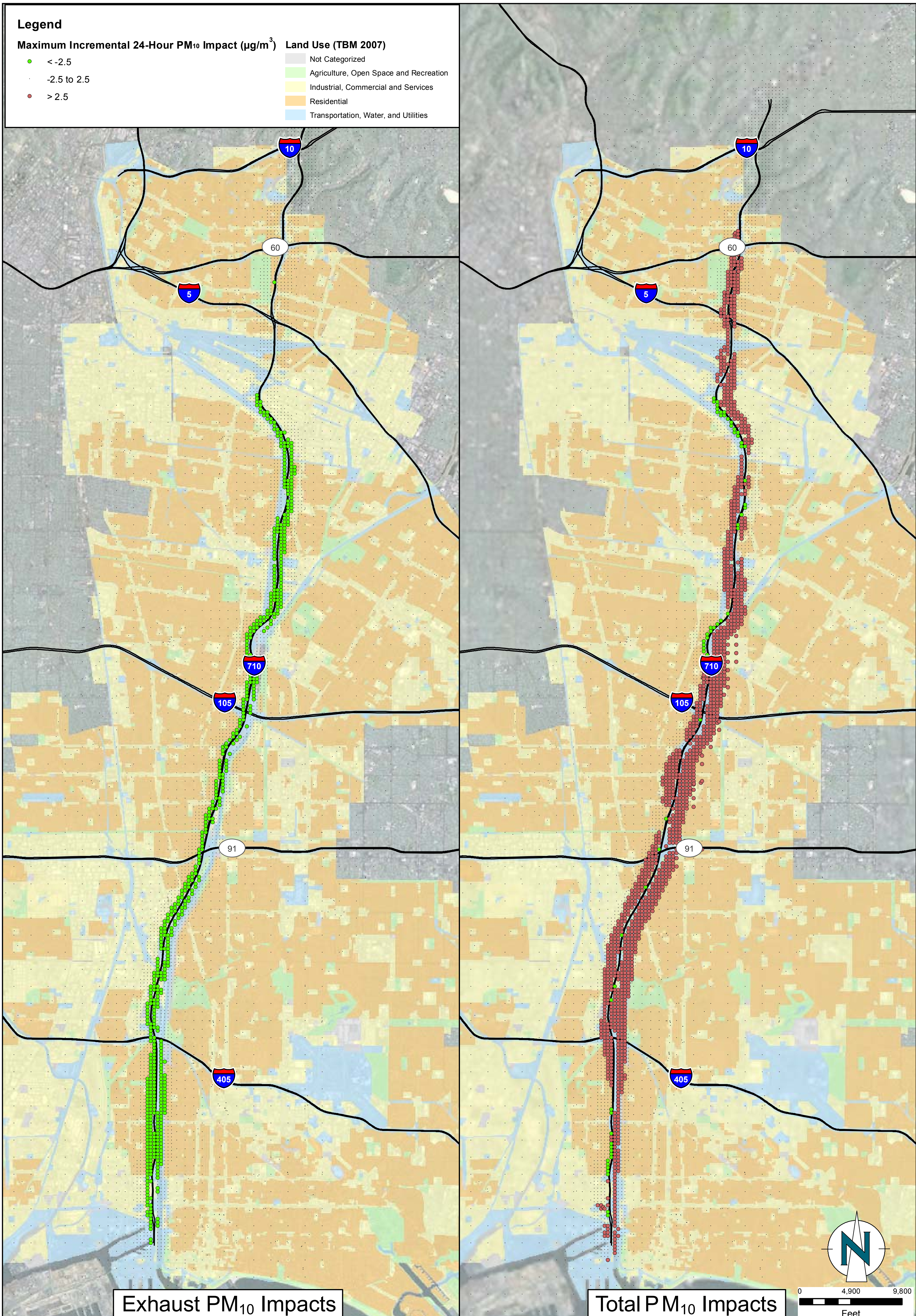
Comparison of
2035 Alternative 6A to 2008 Baseline
Maximum Incremental 24-Hour PM_{10} Impacts

Figure
4.19

PROJECT: 05-18574E4



ENVIRON

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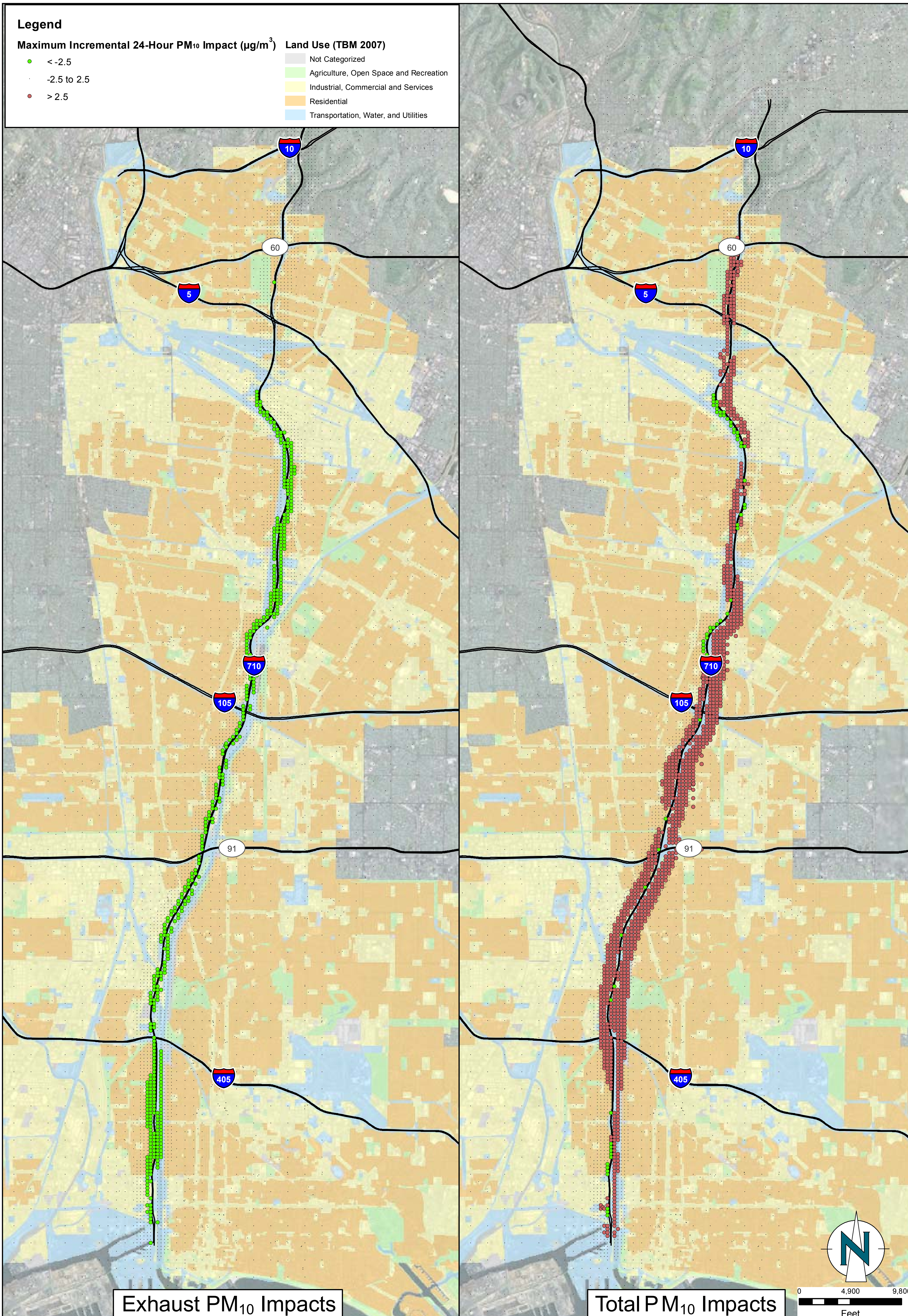
Comparison of
2035 Alternative 6B to 2008 Baseline
Maximum Incremental 24-Hour PM_{10} Impacts

Figure
4.20

PROJECT: 05-18574E4



ENVIRON

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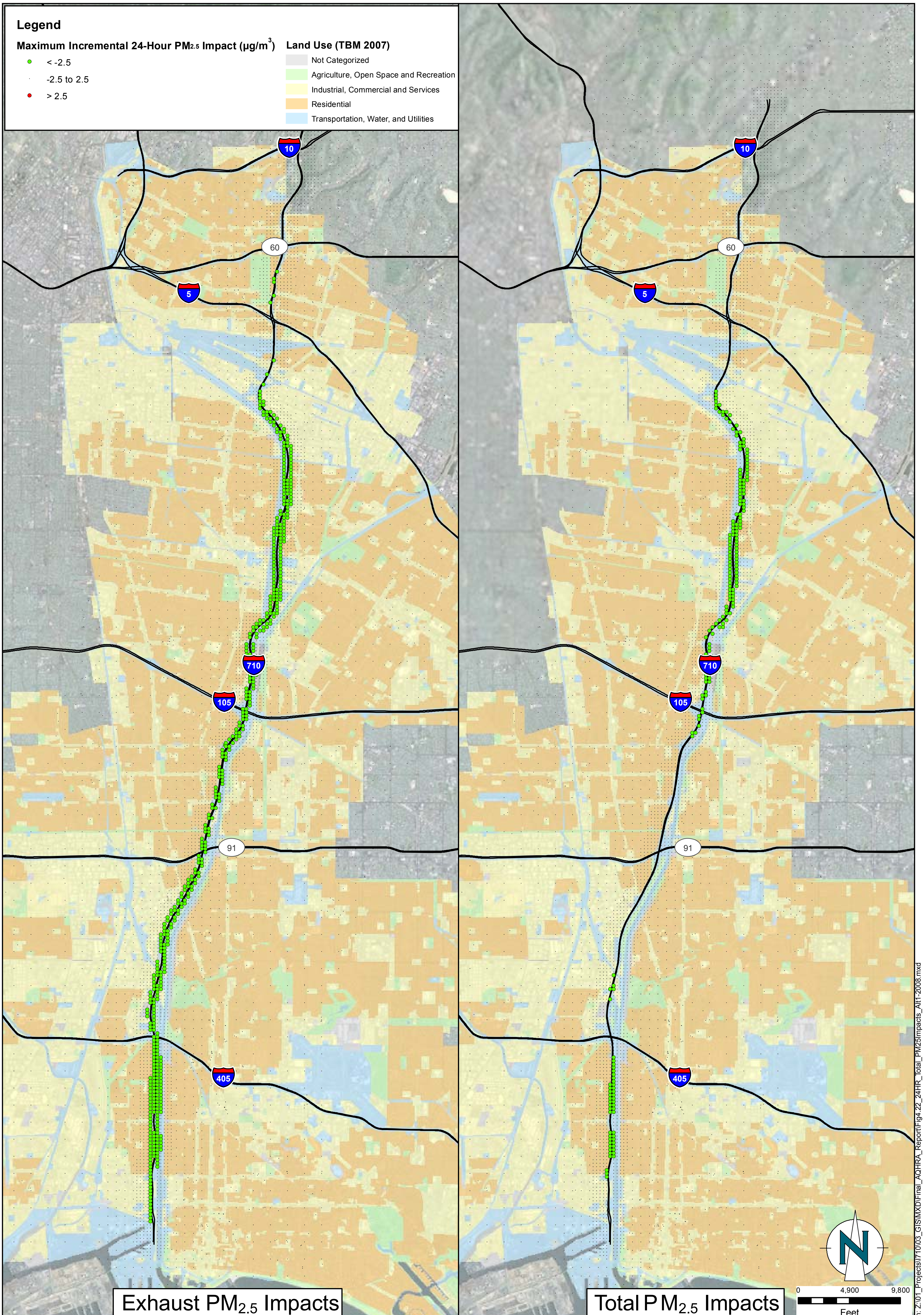
Comparison of
2035 Alternative 6C to 2008 Baseline
Maximum Incremental 24-Hour PM_{10} Impacts

Figure
4.21

PROJECT: 05-18574E4



ENVIRON

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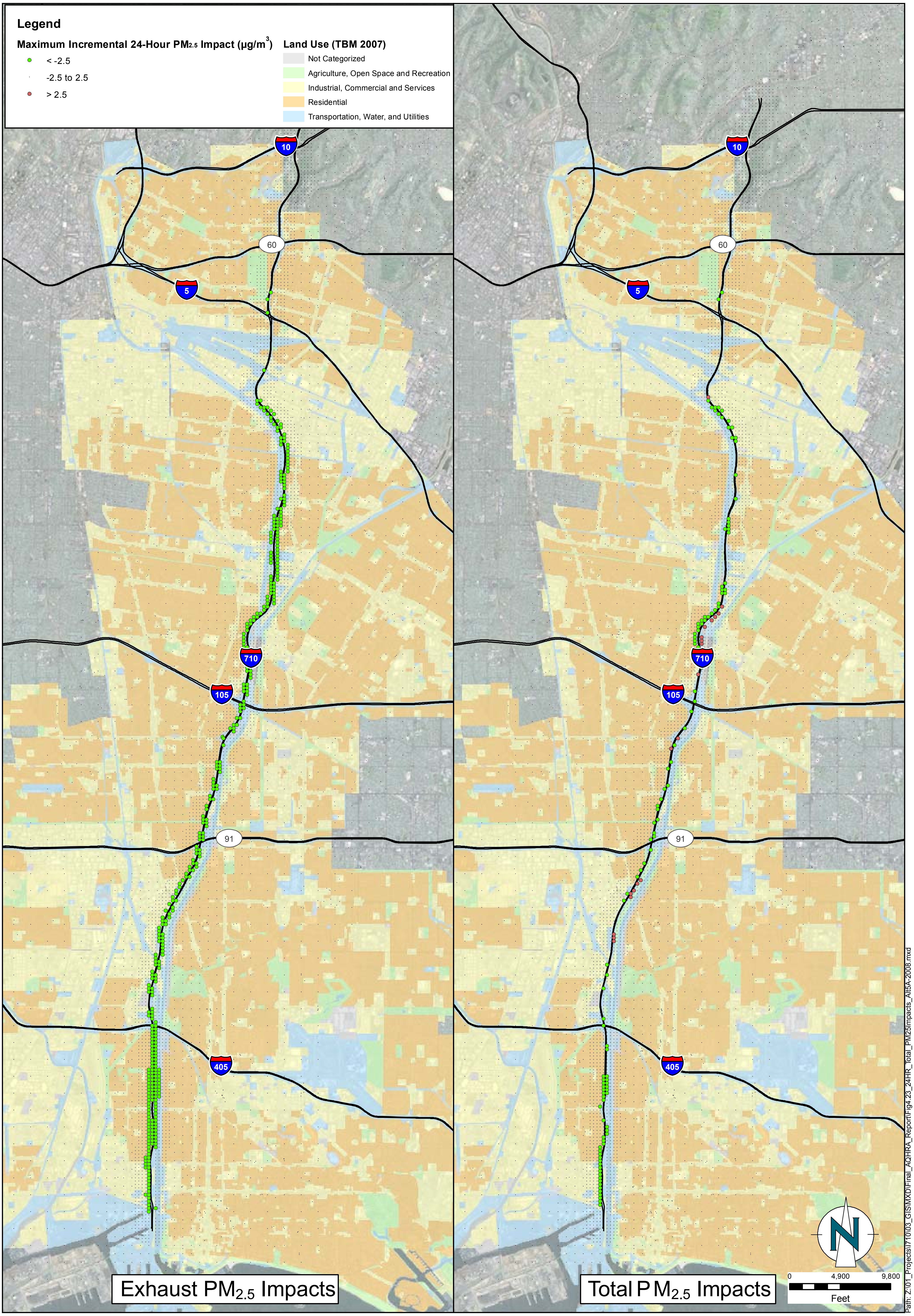
Date: 1/26/2012

Comparison of
2035 Alternative 1 to 2008 Baseline
Maximum Incremental 24-Hour $PM_{2.5}$ Impacts

Figure
4.22

PROJECT: 05-18574E4



ENVIRON

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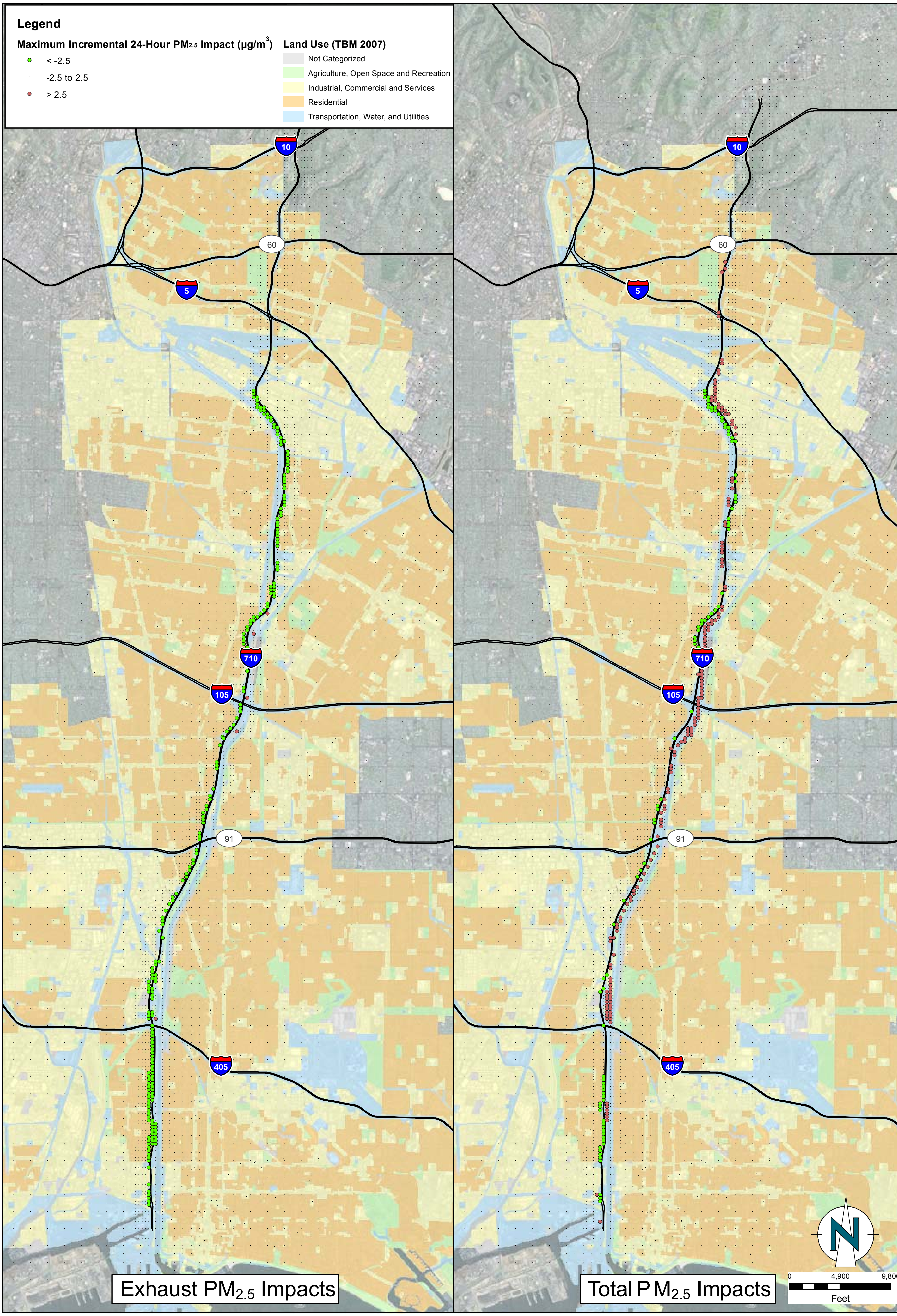
Date: 1/30/2012

Comparison of
2035 Alternative 5A to 2008 Baseline
Maximum Incremental 24-Hour $PM_{2.5}$ Impacts

Figure
4.23

PROJECT: 05-18574E4



ENVIRON

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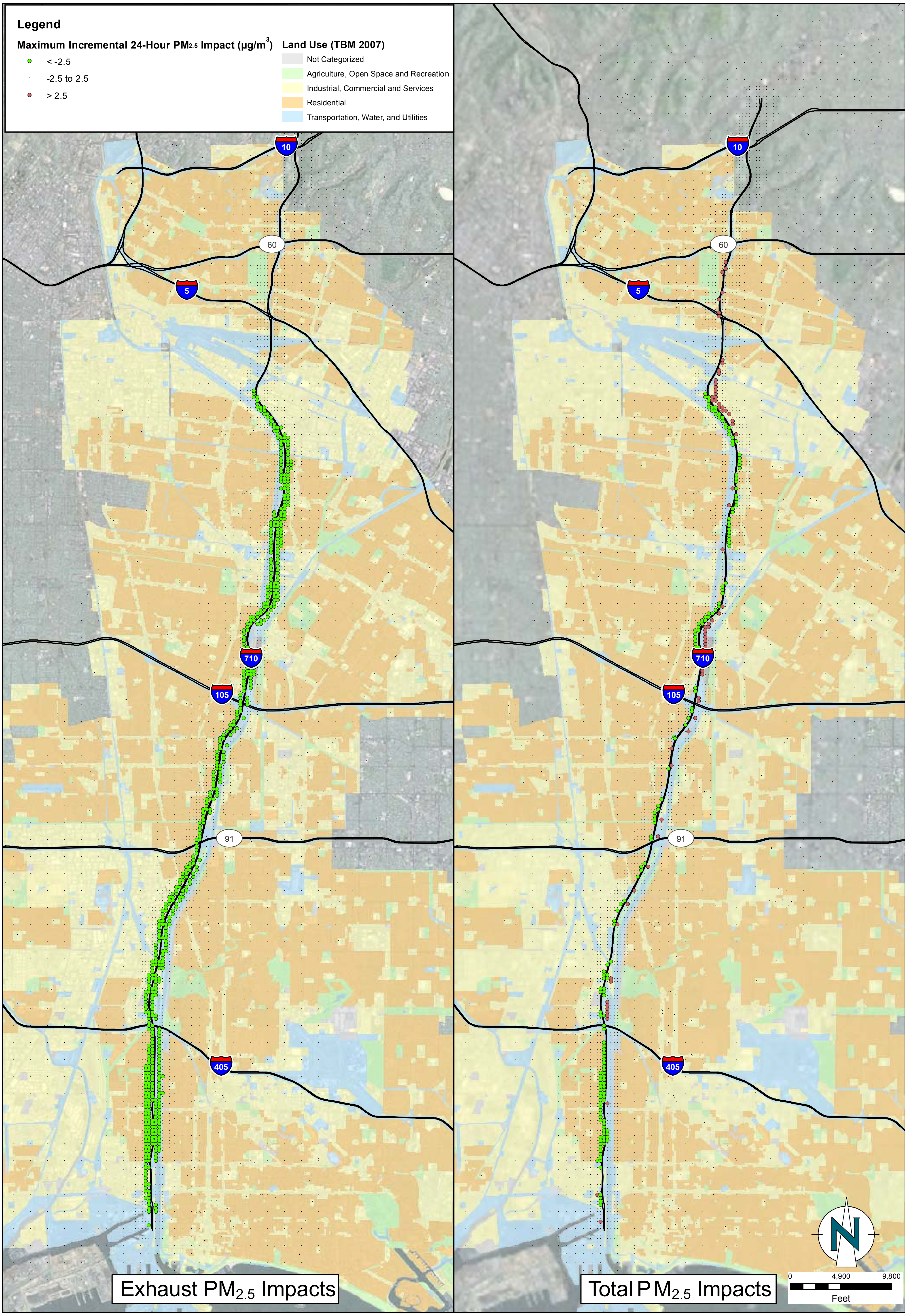
Comparison of
2035 Alternative 6A to 2008 Baseline
Maximum Incremental 24-Hour $PM_{2.5}$ Impacts

Figure
4.24

PROJECT: 05-18574E4



ENVIRON

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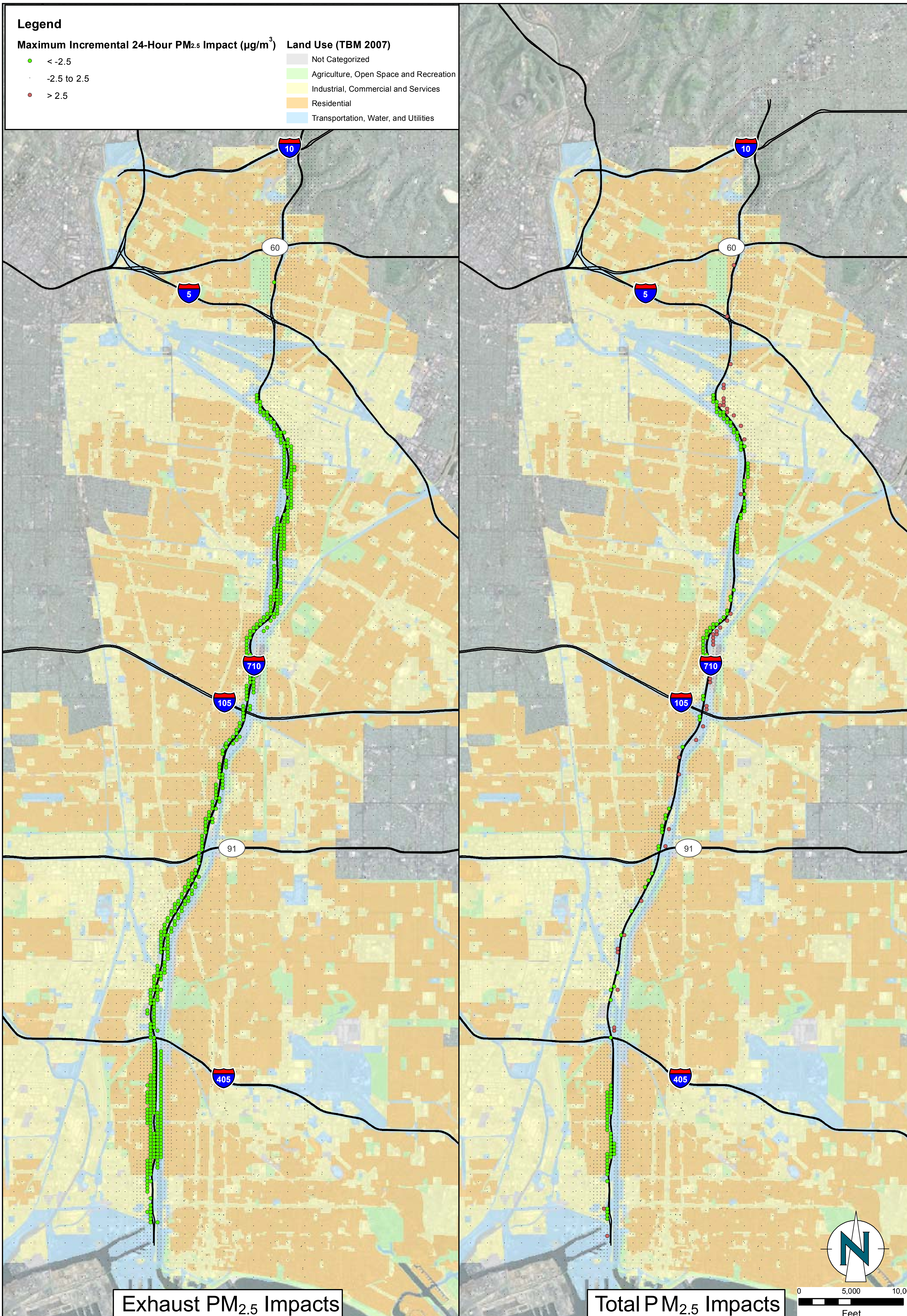
Date: 1/26/2012

Comparison of
2035 Alternative 6B to 2008 Baseline
Maximum Incremental 24-Hour $PM_{2.5}$ Impacts

Figure
4.25

PROJECT: 05-18574E4



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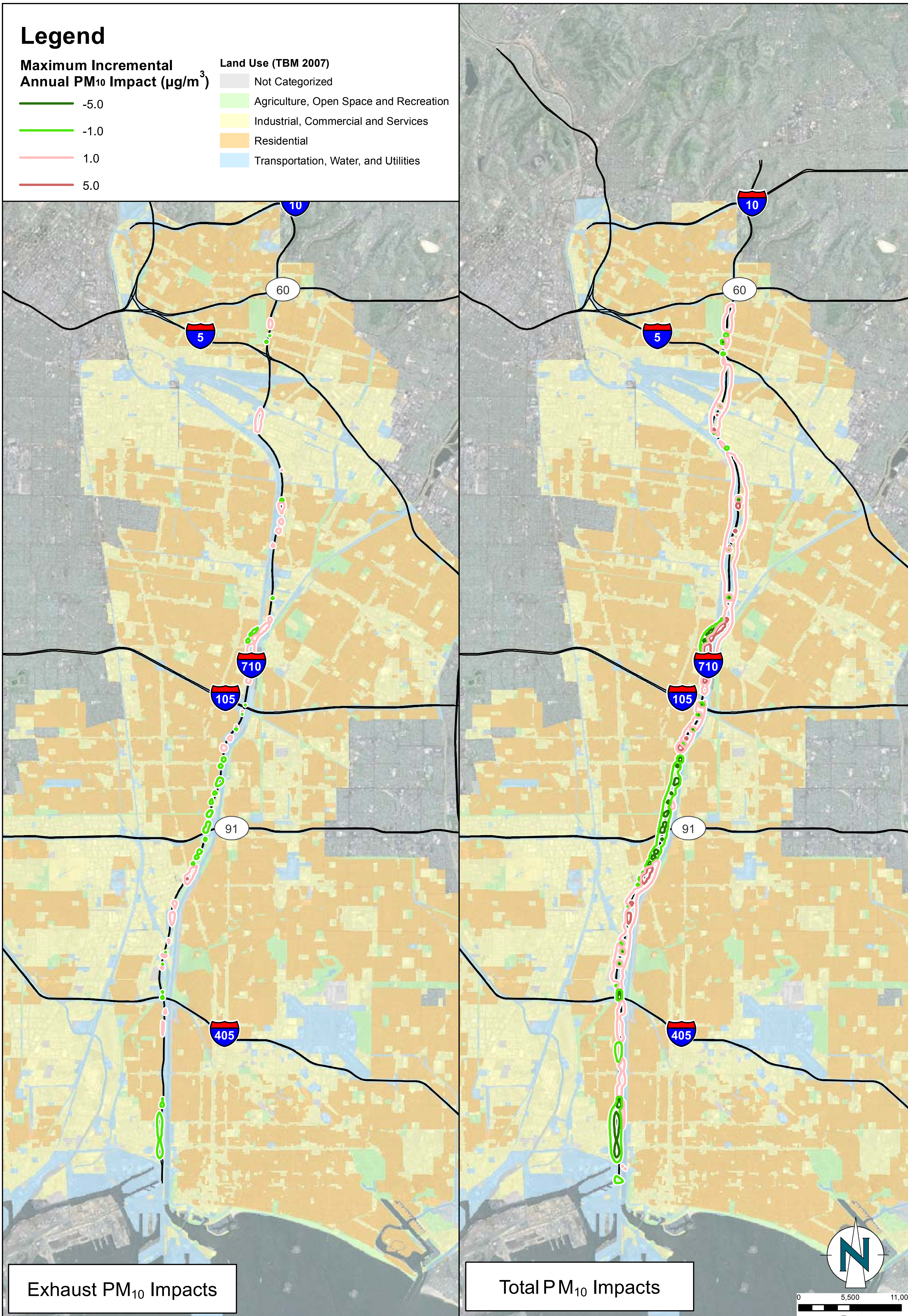
Comparison of 2035 Alternative 6C to 2008 Baseline Maximum Incremental 24-Hour $PM_{2.5}$ Impacts

Figure 4.26

PROJECT: 05-18574E4



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ENVIRON

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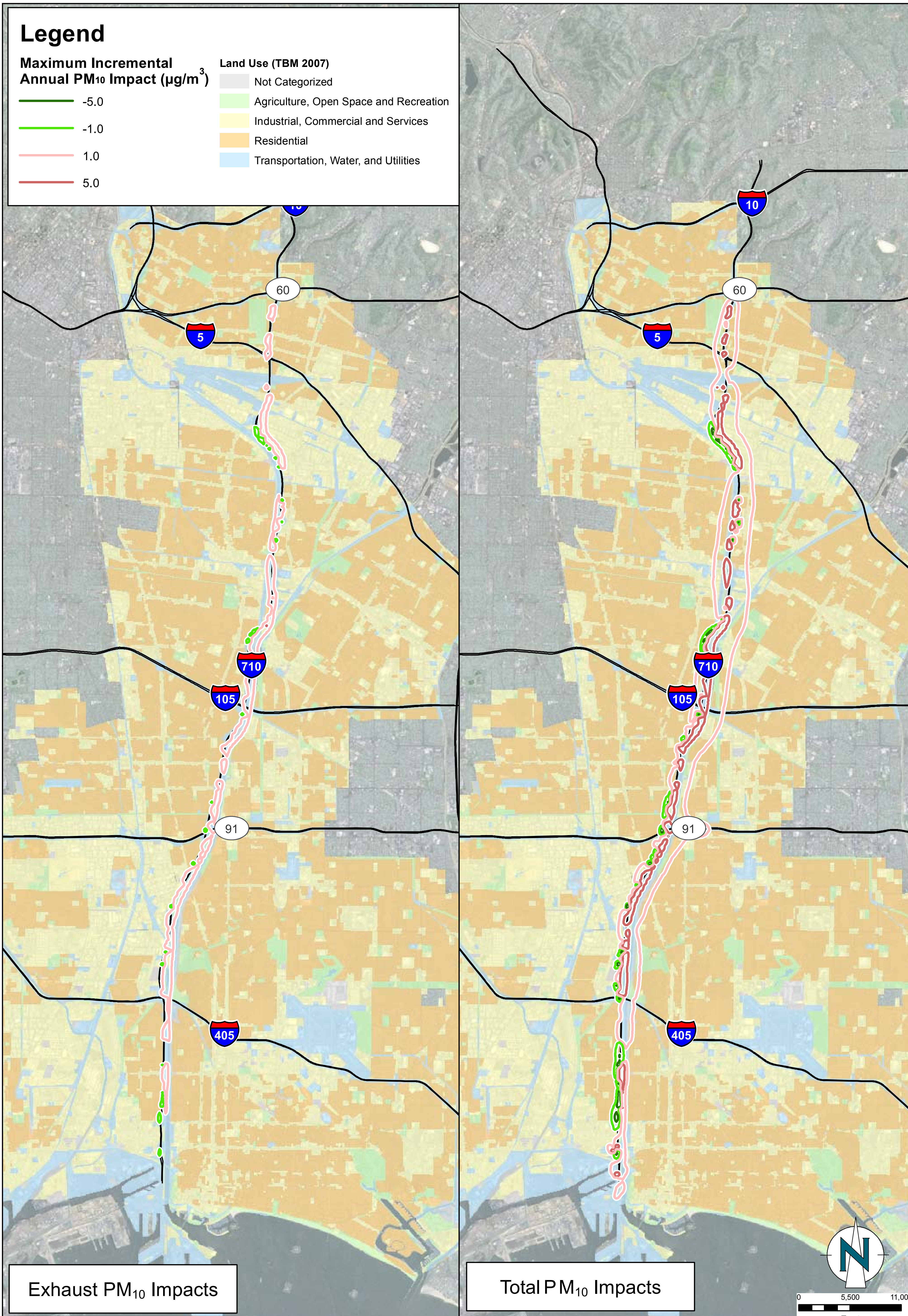
Date: 1/26/2012

Comparison of
2035 Alternative 5A to 2035 Alternative 1
Maximum Incremental Annual PM_{10} Impacts

Figure 4.27

PROJECT: 05-18574E4



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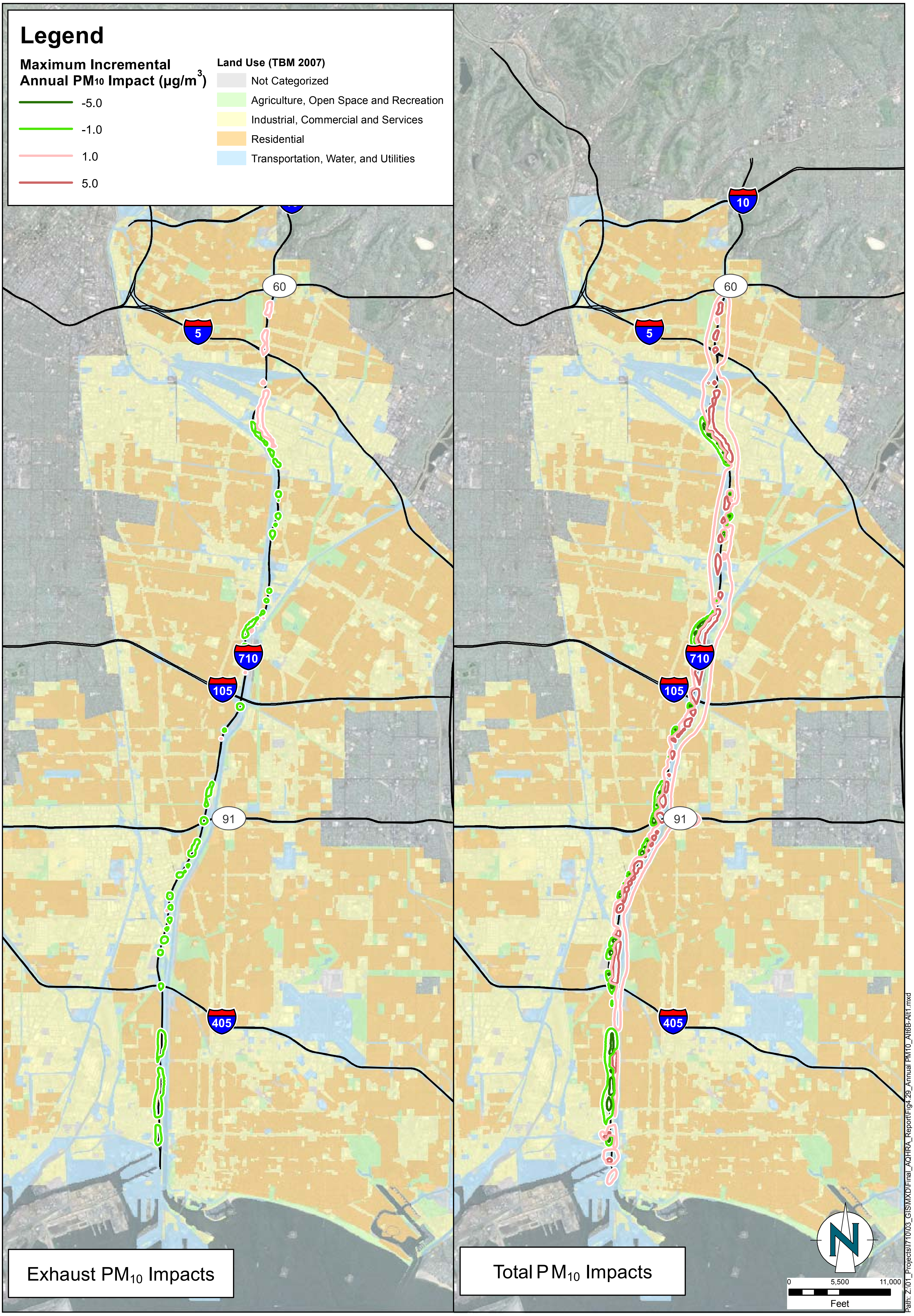
DRAFTED BY: SD

Date: 1/26/2012

Comparison of
2035 Alternative 6A to 2035 Alternative 1
Maximum Incremental Annual PM_{10} Impacts

Figure
4.28

PROJECT: 05-18574E4



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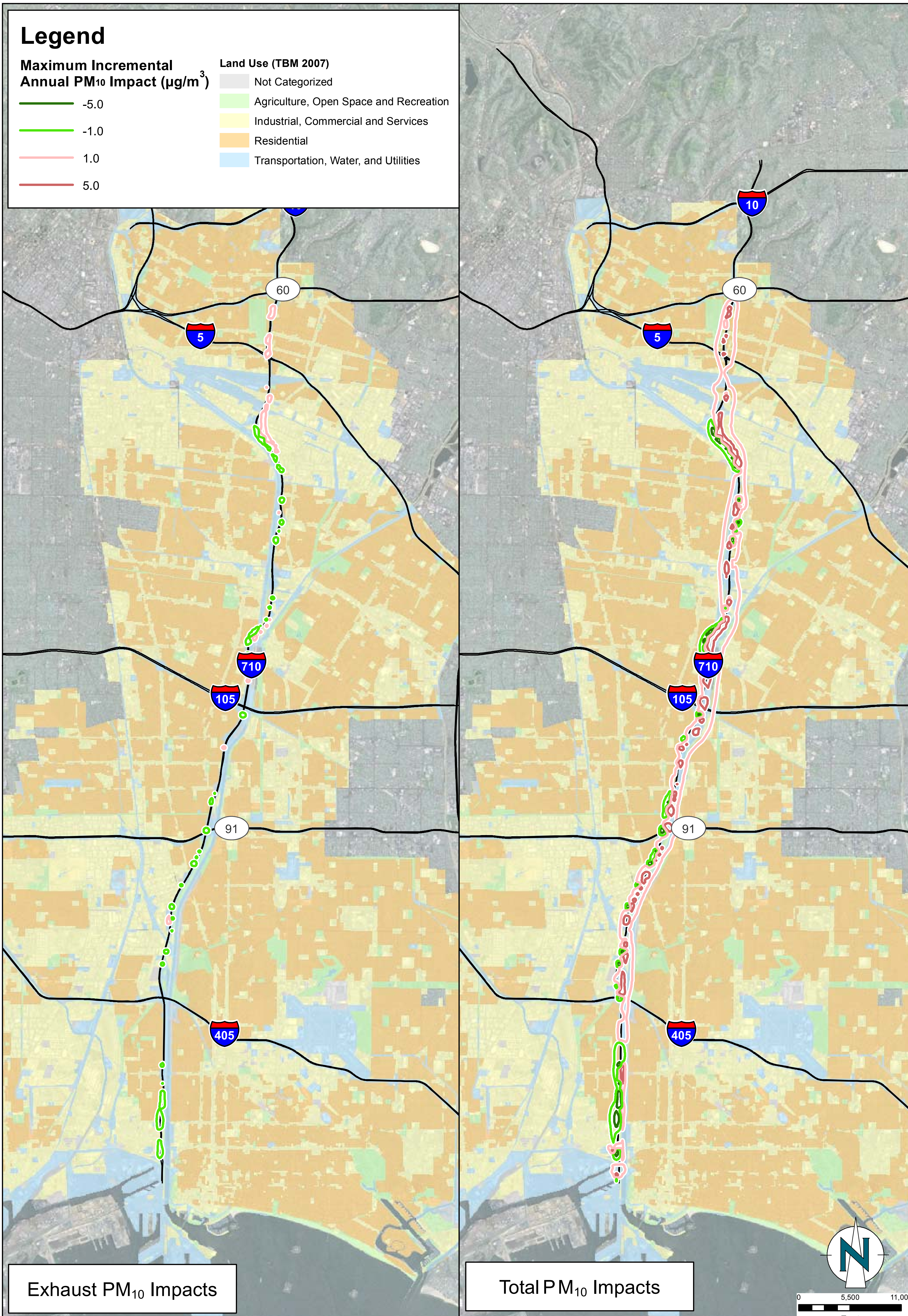
DRAFTED BY: SD

Date: 1/26/2012

Comparison of
2035 Alternative 6B to 2035 Alternative 1
Maximum Incremental Annual PM_{10} Impacts

Figure
4.29

PROJECT: 05-18574E4



ENVIRON

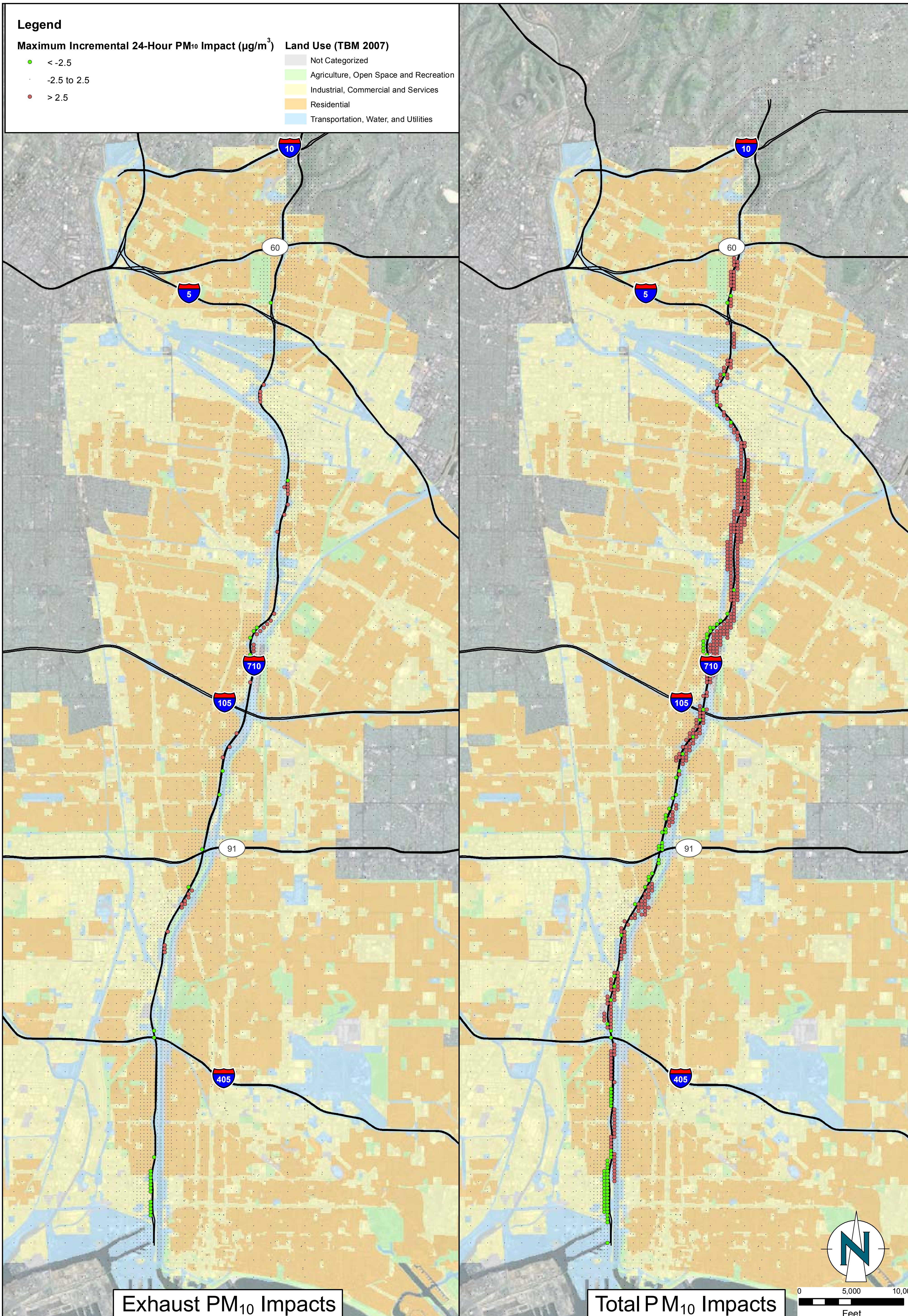
DRAFTED BY: SD

Date: 1/26/2012

Comparison of
2035 Alternative 6C to 2035 Alternative 1
Maximum Incremental Annual PM_{10} Impacts

Figure
4.30

PROJECT: 05-18574E4



ENVIRON

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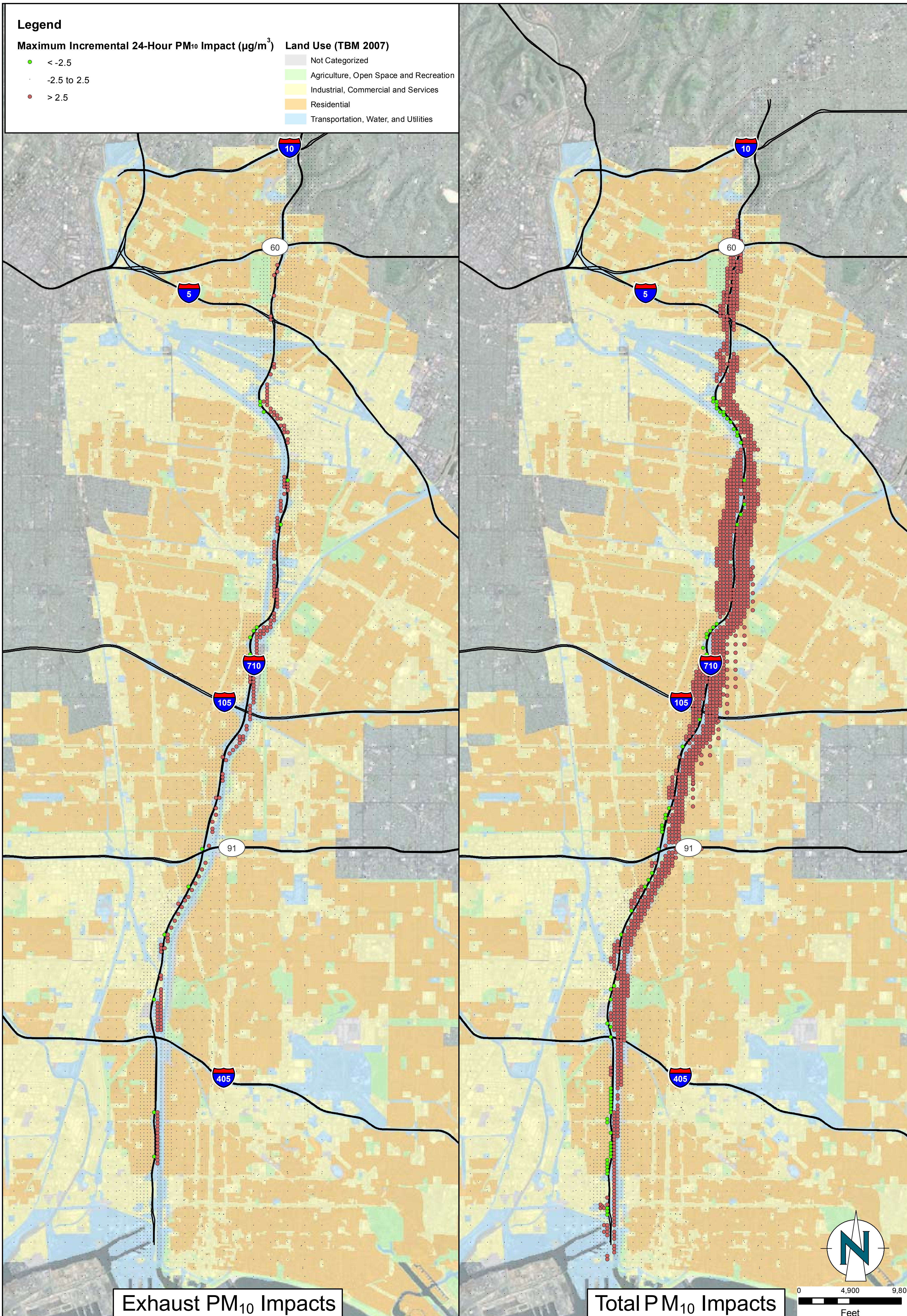
Comparison of
2035 Alternative 5A to 2035 Alternative 1
Maximum Incremental 24-Hour PM_{10} Impacts

Figure
4.31

PROJECT: 05-18574E4



ENVIRON

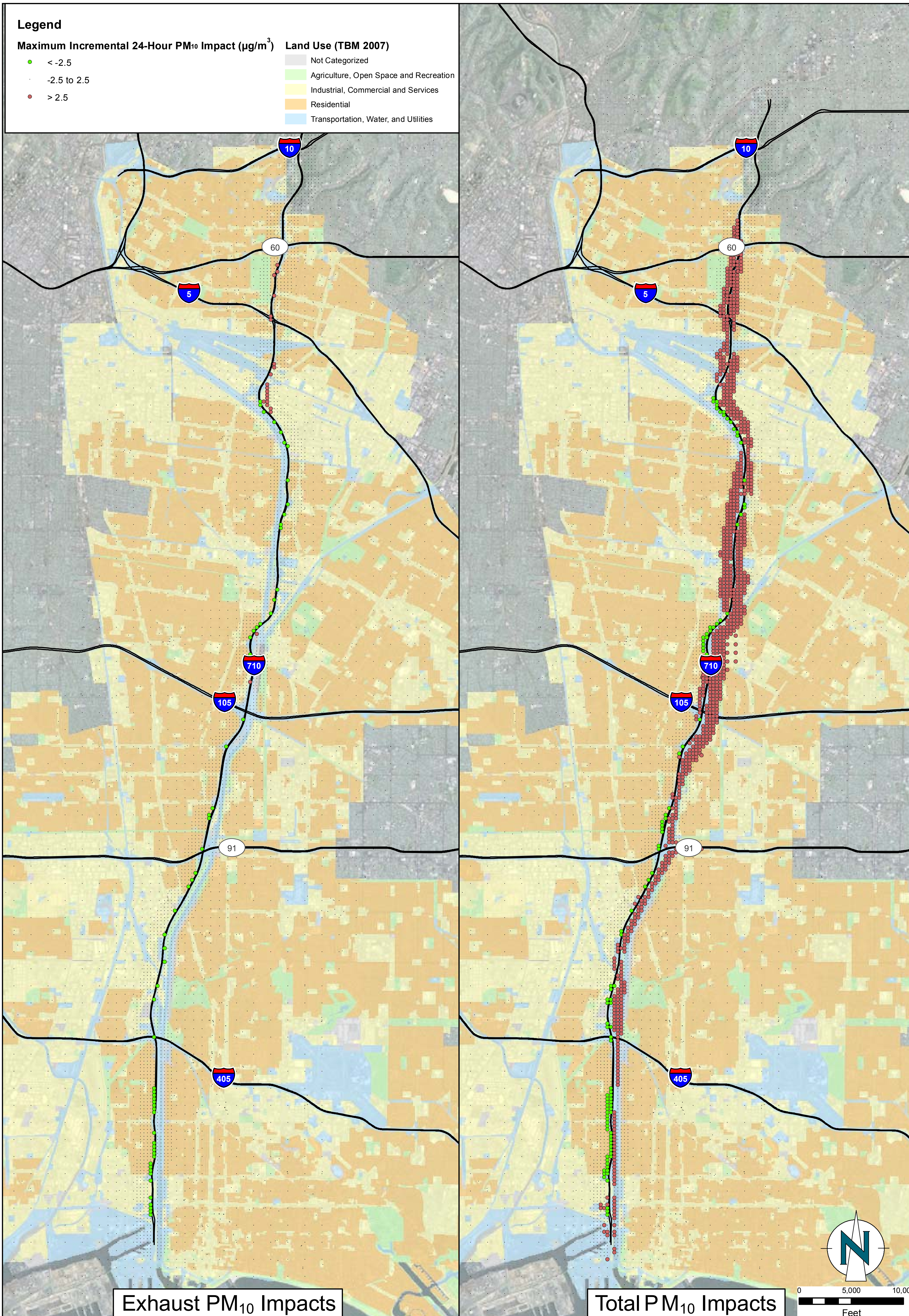
DRAFTED BY: SD

Date: 1/27/2012

Comparison of
2035 Alternative 6A to 2035 Alternative 1
Maximum Incremental 24-Hour PM_{10} Impacts

Figure
4.32

PROJECT: 05-18574E4



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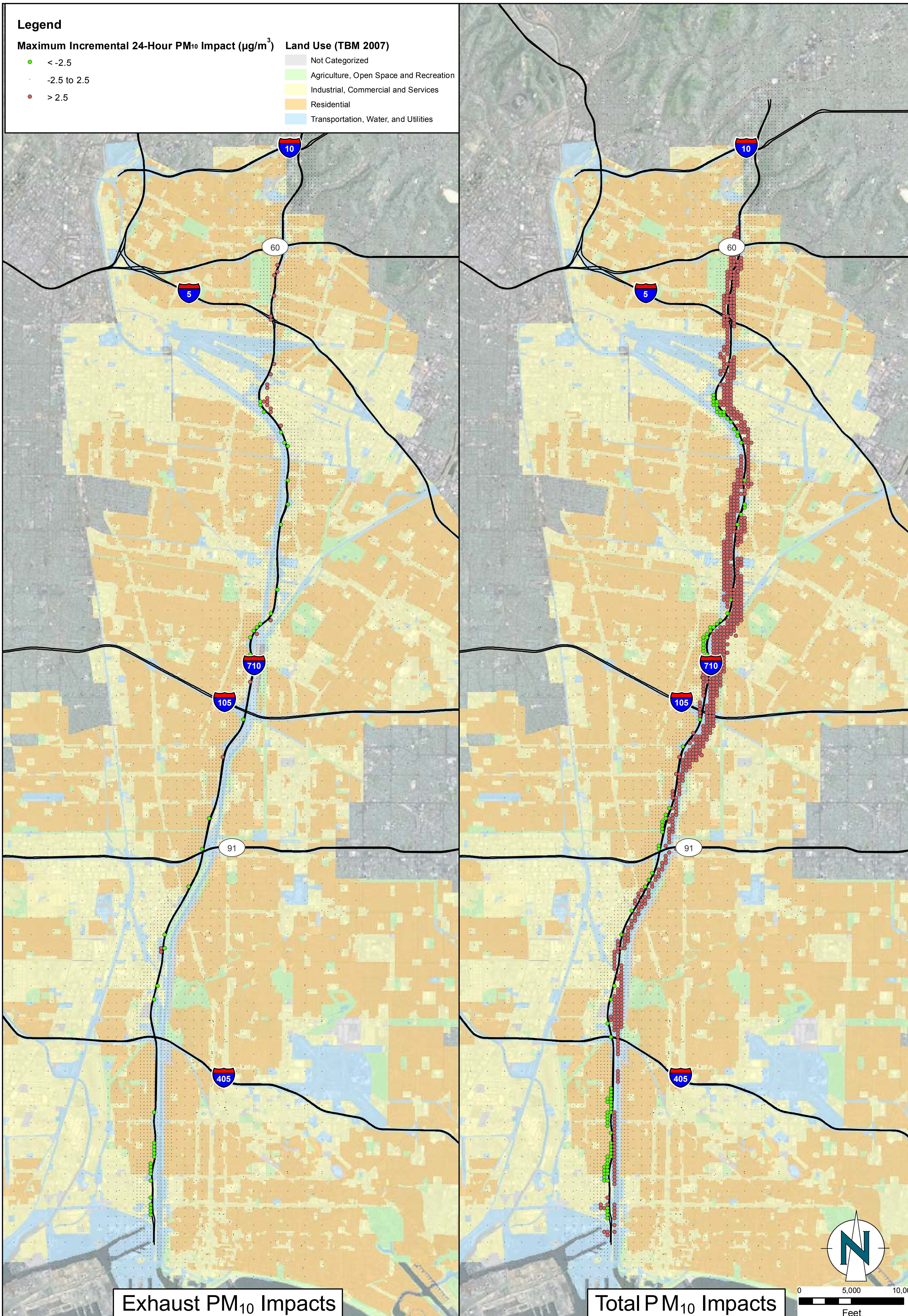
Date: 1/27/2012

Comparison of
2035 Alternative 6B to 2035 Alternative 1
Maximum Incremental 24-Hour PM_{10} Impacts

Figure
4.33

PROJECT: 05-18574E4



ENVIRON

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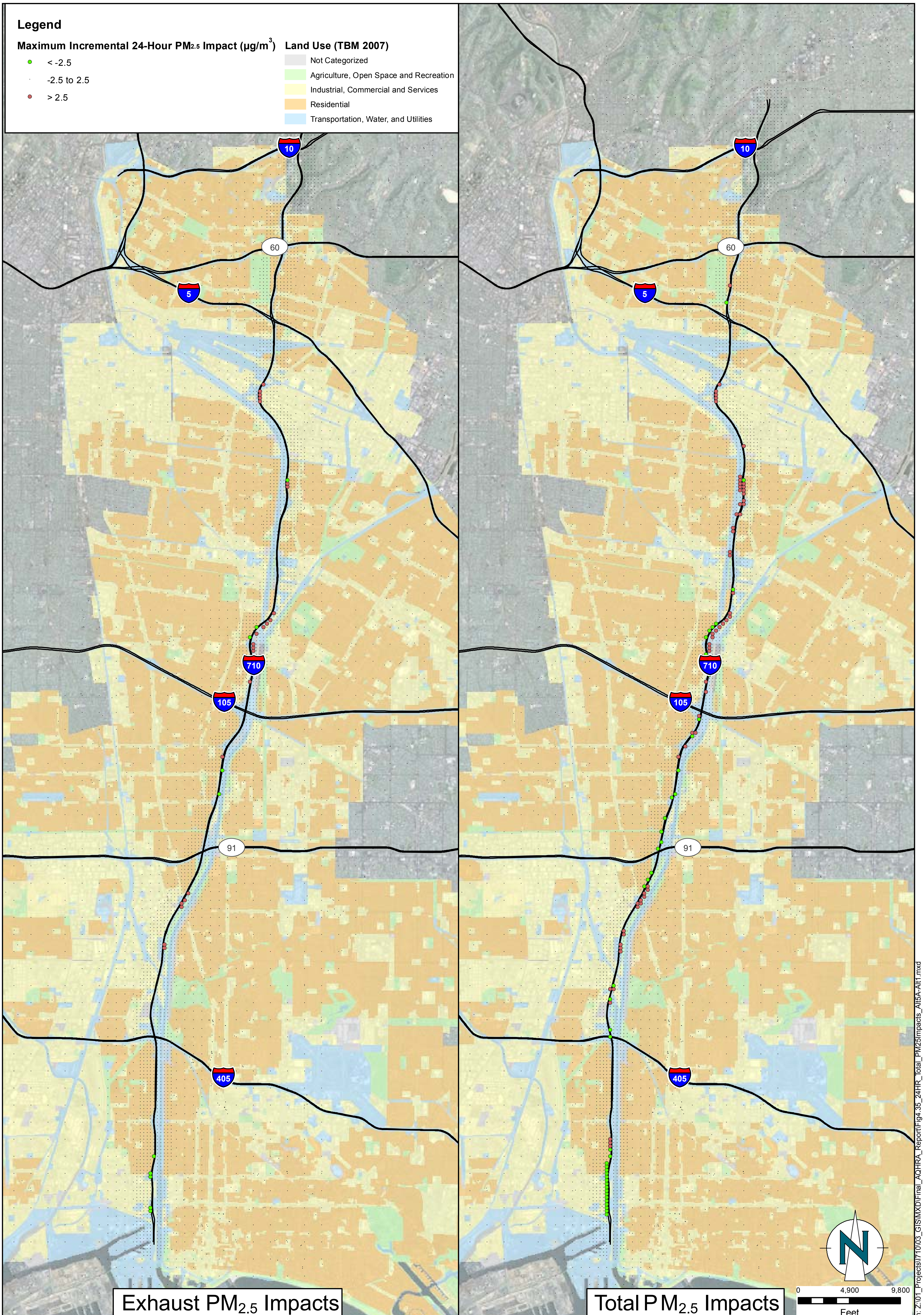
Date: 1/27/2012

Comparison of
2035 Alternative 6C to 2035 Alternative 1
Maximum Incremental 24-Hour PM_{10} Impacts

Figure
4.34

PROJECT: 05-18574E4



ENVIRON

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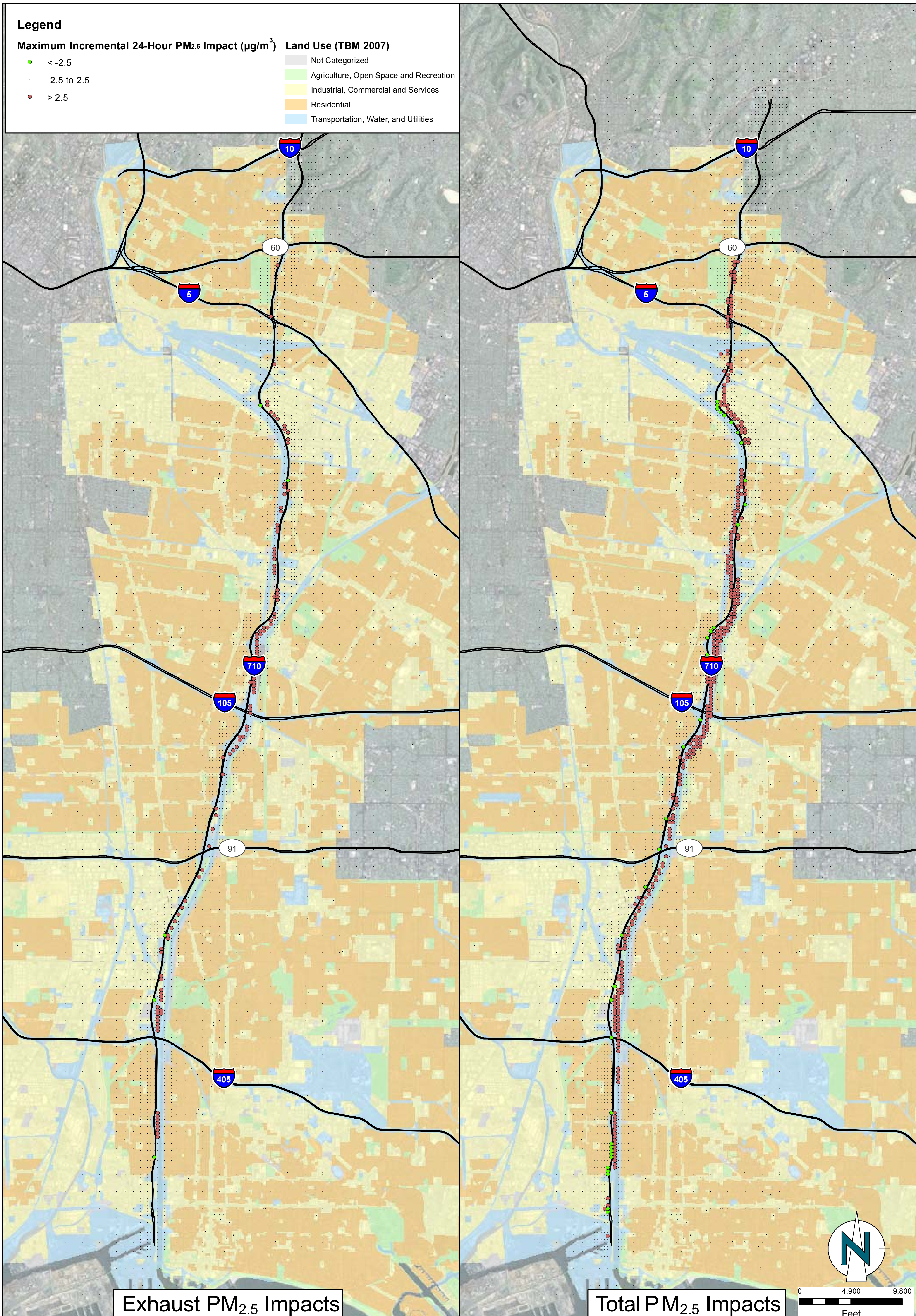
Comparison of
2035 Alternative 5A to 2035 Alternative 1
Maximum Incremental 24-Hour $PM_{2.5}$ Impacts

Figure
4.35

PROJECT: 05-18574E4



ENVIRON

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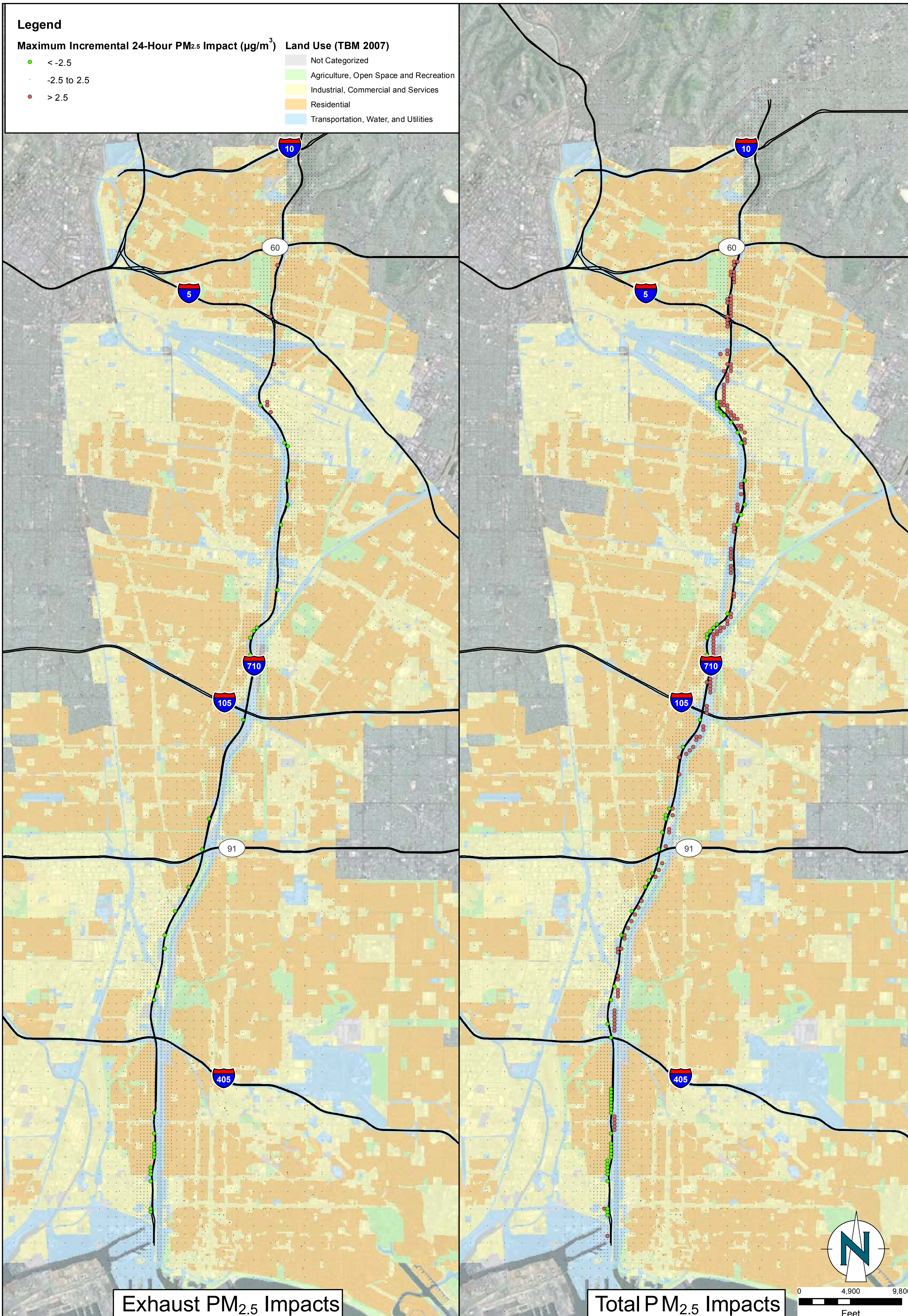
Date: 1/26/2012

Comparison of 2035 Alternative 6A to 2035 Alternative 1 Maximum Incremental 24-Hour $PM_{2.5}$ Impacts

Figure 4.36

PROJECT: 05-18574E4



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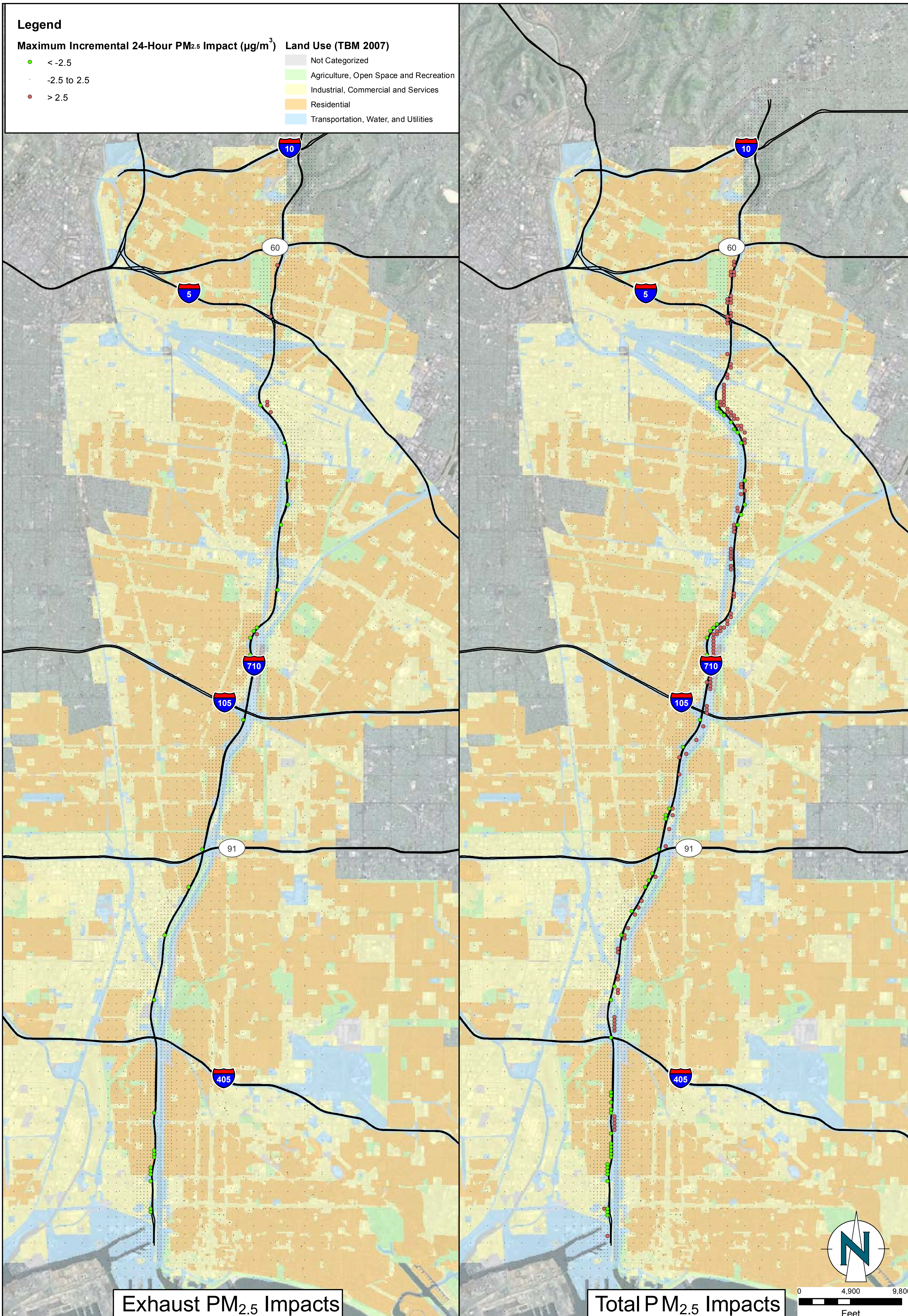
Comparison of
2035 Alternative 6B to 2035 Alternative 1
Maximum Incremental 24-Hour $PM_{2.5}$ Impacts

Figure
4.37

PROJECT: 05-18574E4



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ENVIRON

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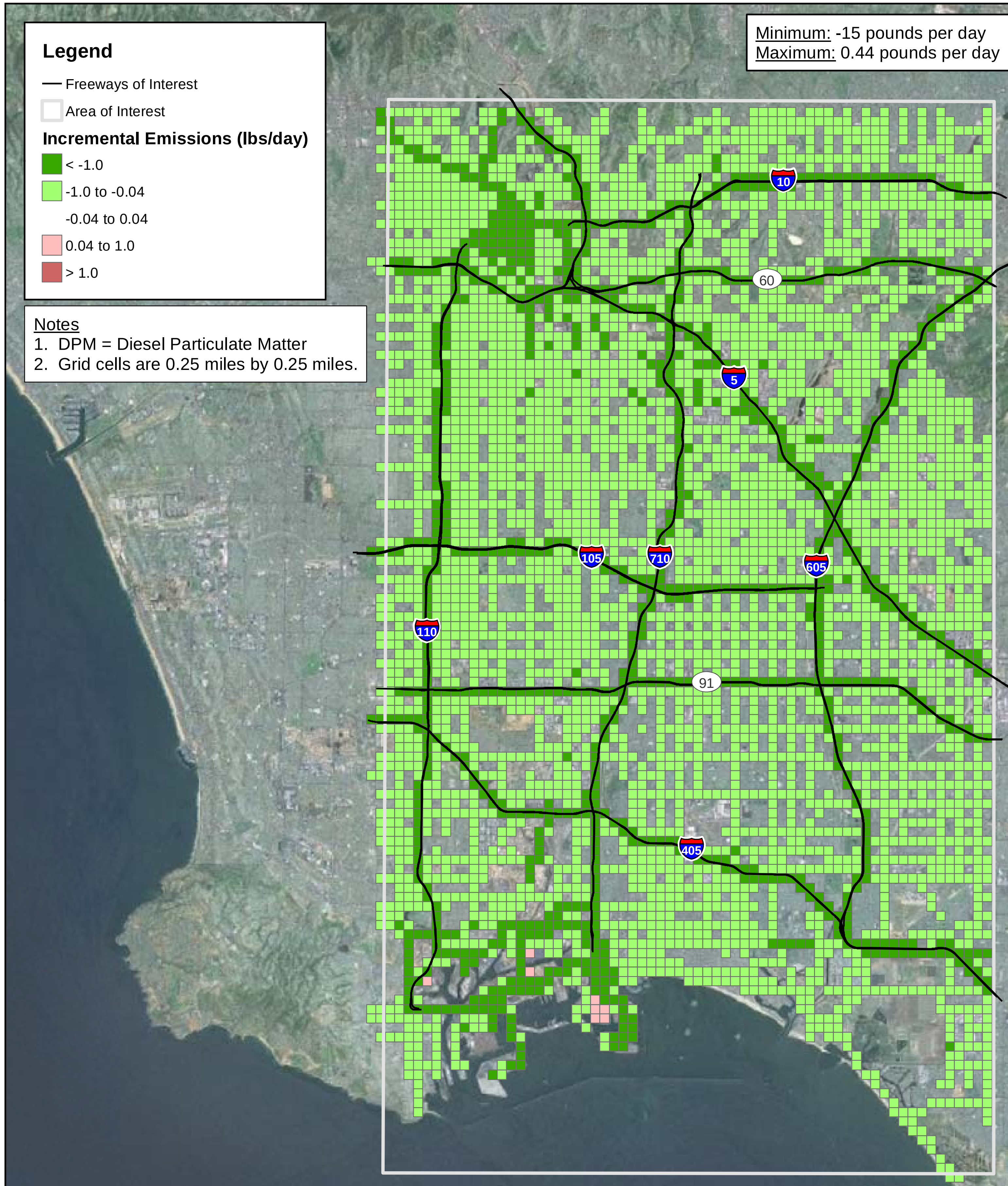
Date: 1/26/2012

Comparison of
2035 Alternative 6C to 2035 Alternative 1
Maximum Incremental 24-Hour $PM_{2.5}$ Impacts

Figure
4.38

PROJECT: 05-18574E4



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ENVIRON

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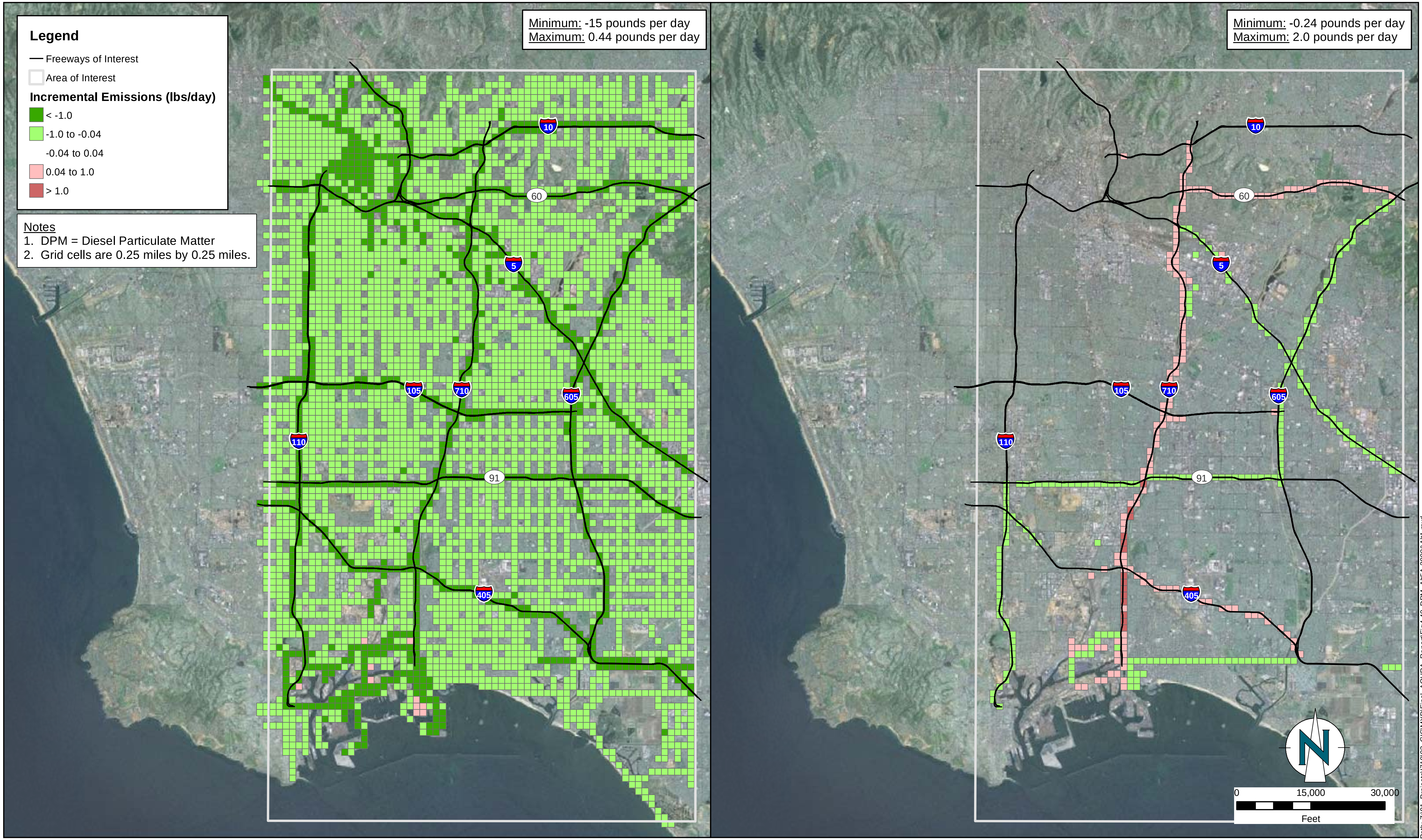
Comparison of
2035 Alternative 1 to 2008 Baseline
DPM Emissions

Figure
4.39

PROJECT: 05-18574E4



ENVIRON

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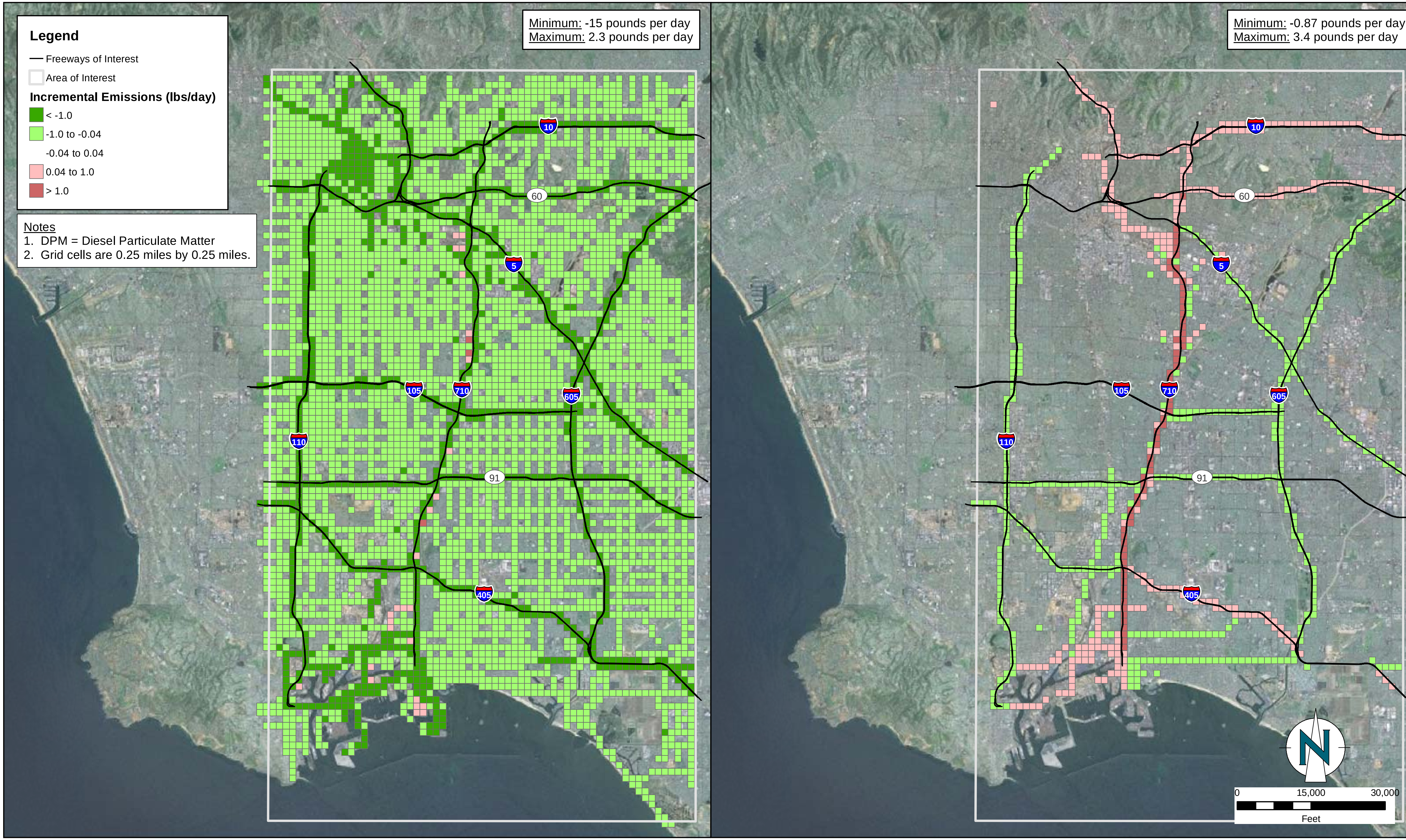
Comparison of
2035 Alternative 5A to 2008 Baseline
DPM Emissions

Comparison of
2035 Alternative 5A to 2035 Alternative 1
DPM Emissions

Figure
4.40

PROJECT: 05-18574E4



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ENVIRON

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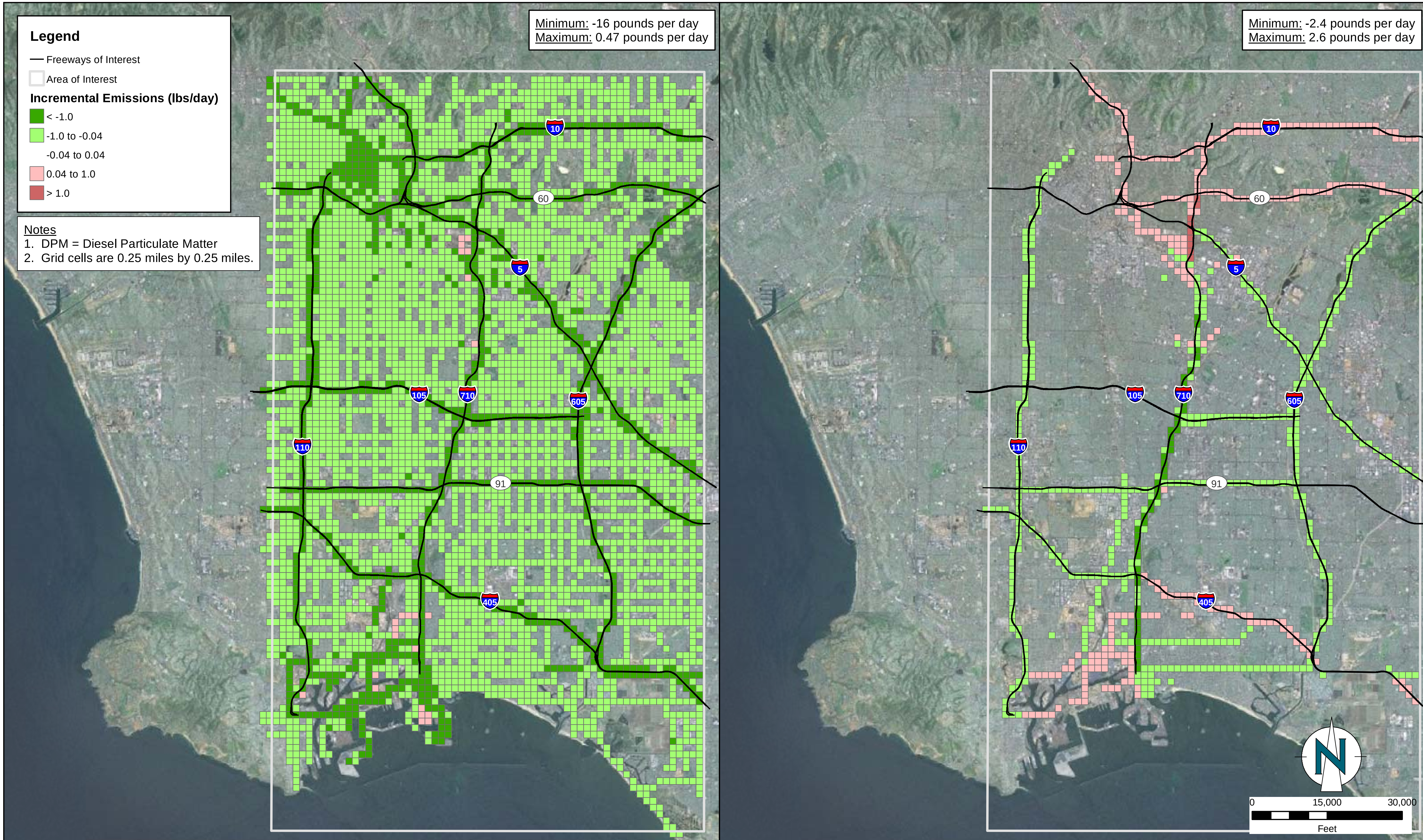
Comparison of
2035 Alternative 6A to 2008 Baseline
DPM Emissions

Comparison of
2035 Alternative 6A to 2035 Alternative 1
DPM Emissions

Figure
4.41

PROJECT: 05-18574E4



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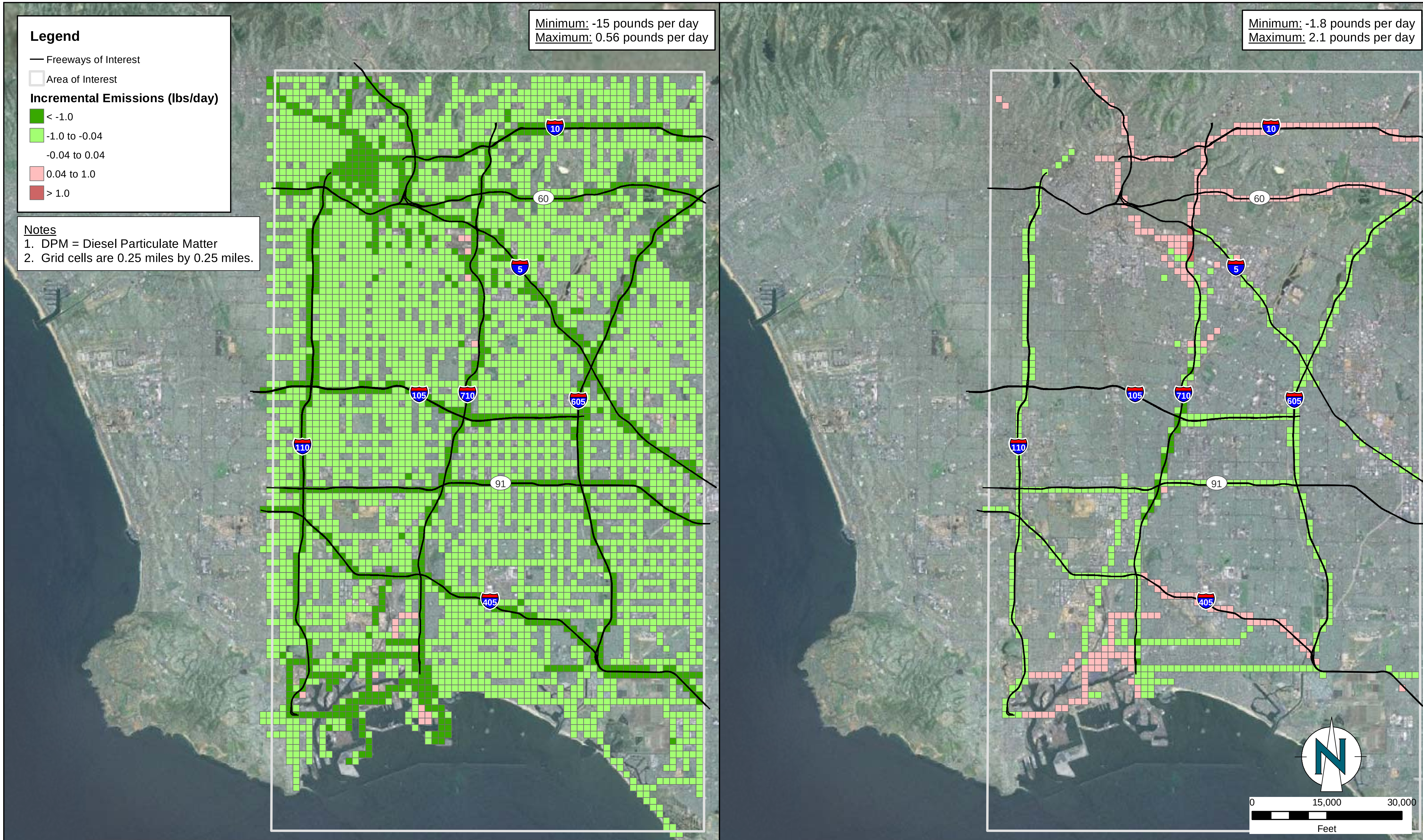
ENVIRON	Comparison of 2035 Alternative 6B to 2008 Baseline DPM Emissions	Comparison of 2035 Alternative 6B to 2035 Alternative 1 DPM Emissions	Figure 4.42
DRAFTED BY: MMM Date: 1/26/2012			PROJECT: 05-18574E4



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ENVIRON

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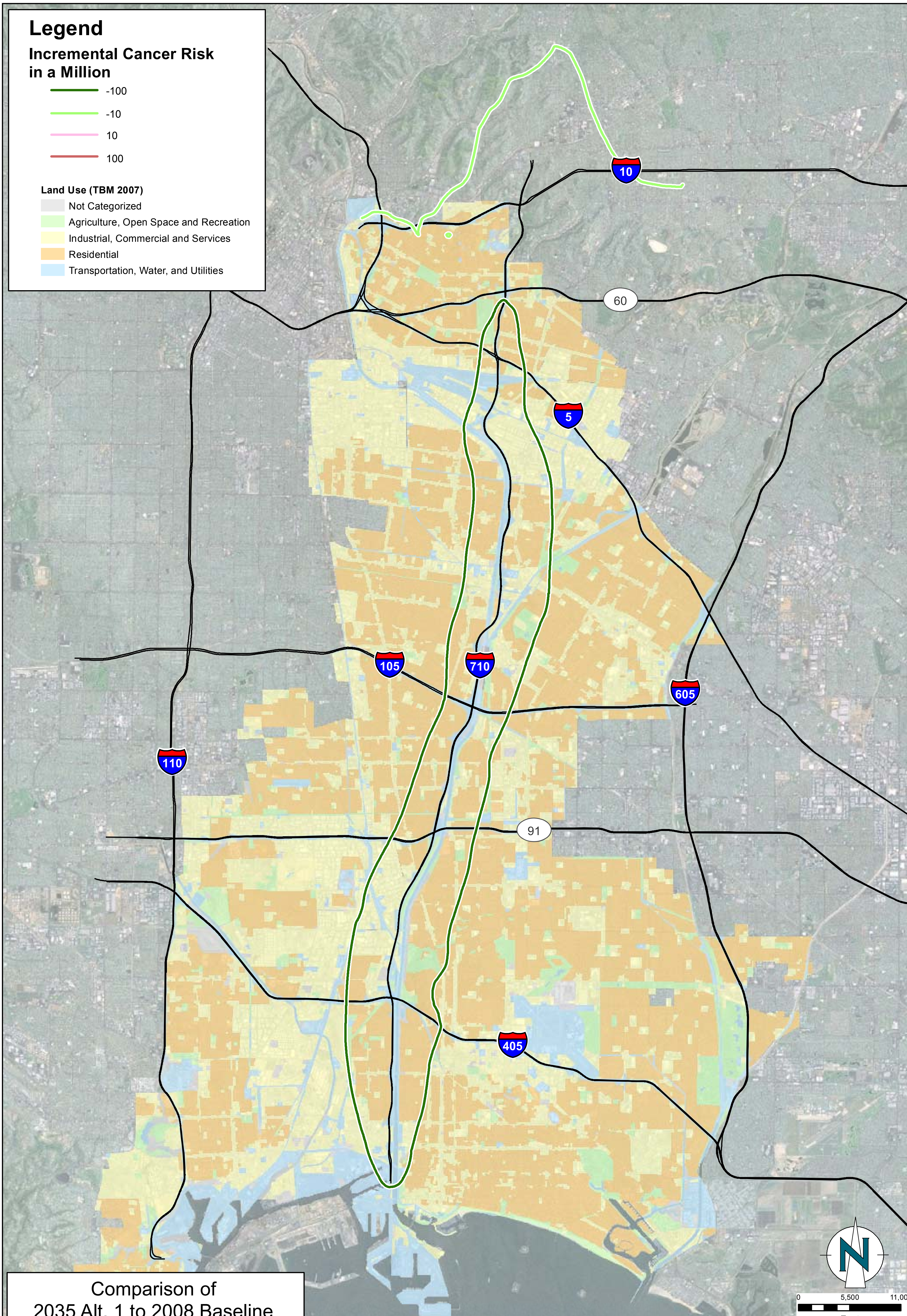
Comparison of
2035 Alternative 6C to 2008 Baseline
DPM Emissions

Comparison of
2035 Alternative 6C to 2035 Alternative 1
DPM Emissions

Figure
4.43

PROJECT: 05-18574E4



ENVIRON

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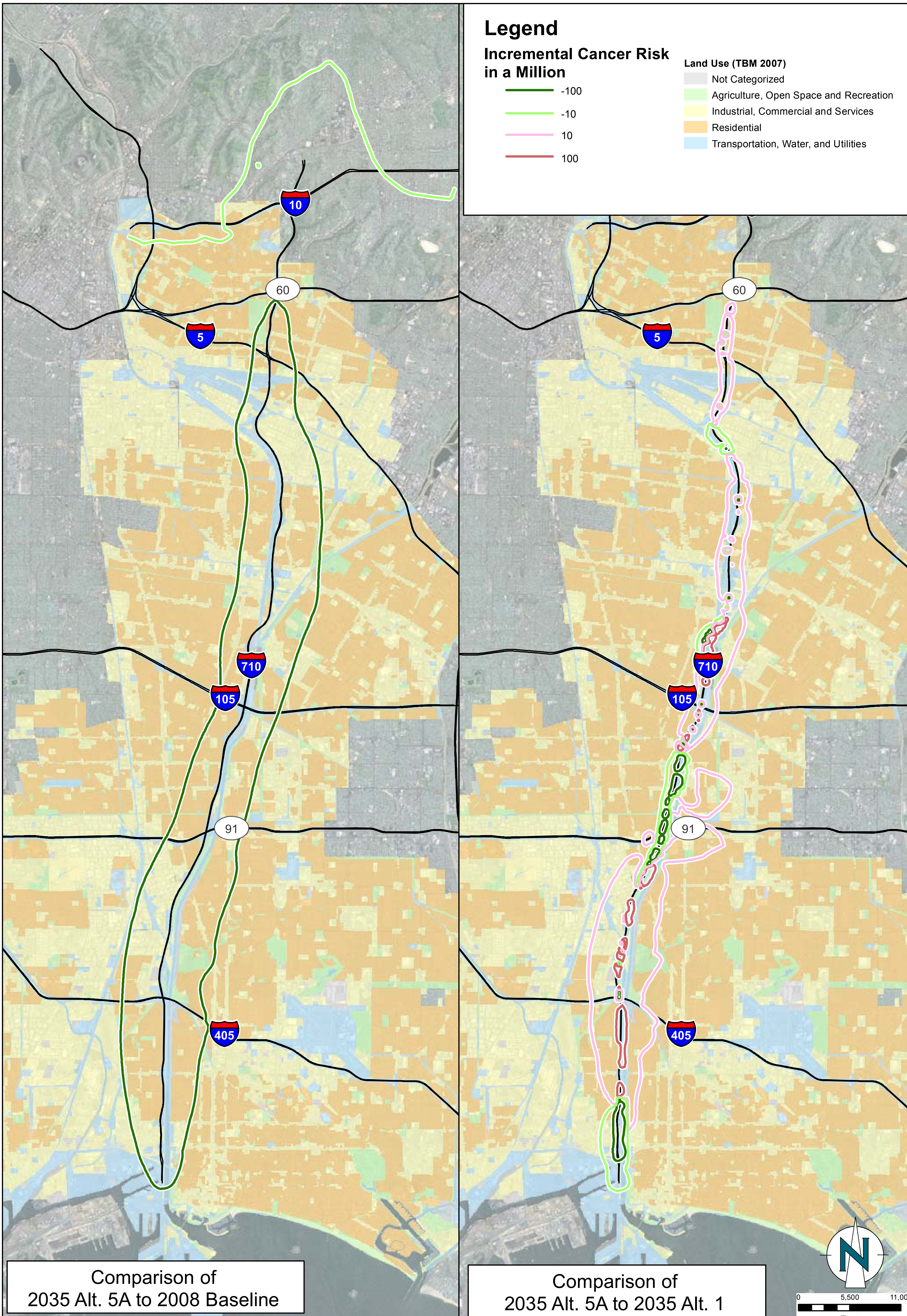
2035 Alternative 1
Incremental Cancer Risk in a Million
(Residential Scenarios)

Figure
4.44

PROJECT: 05-18574E4



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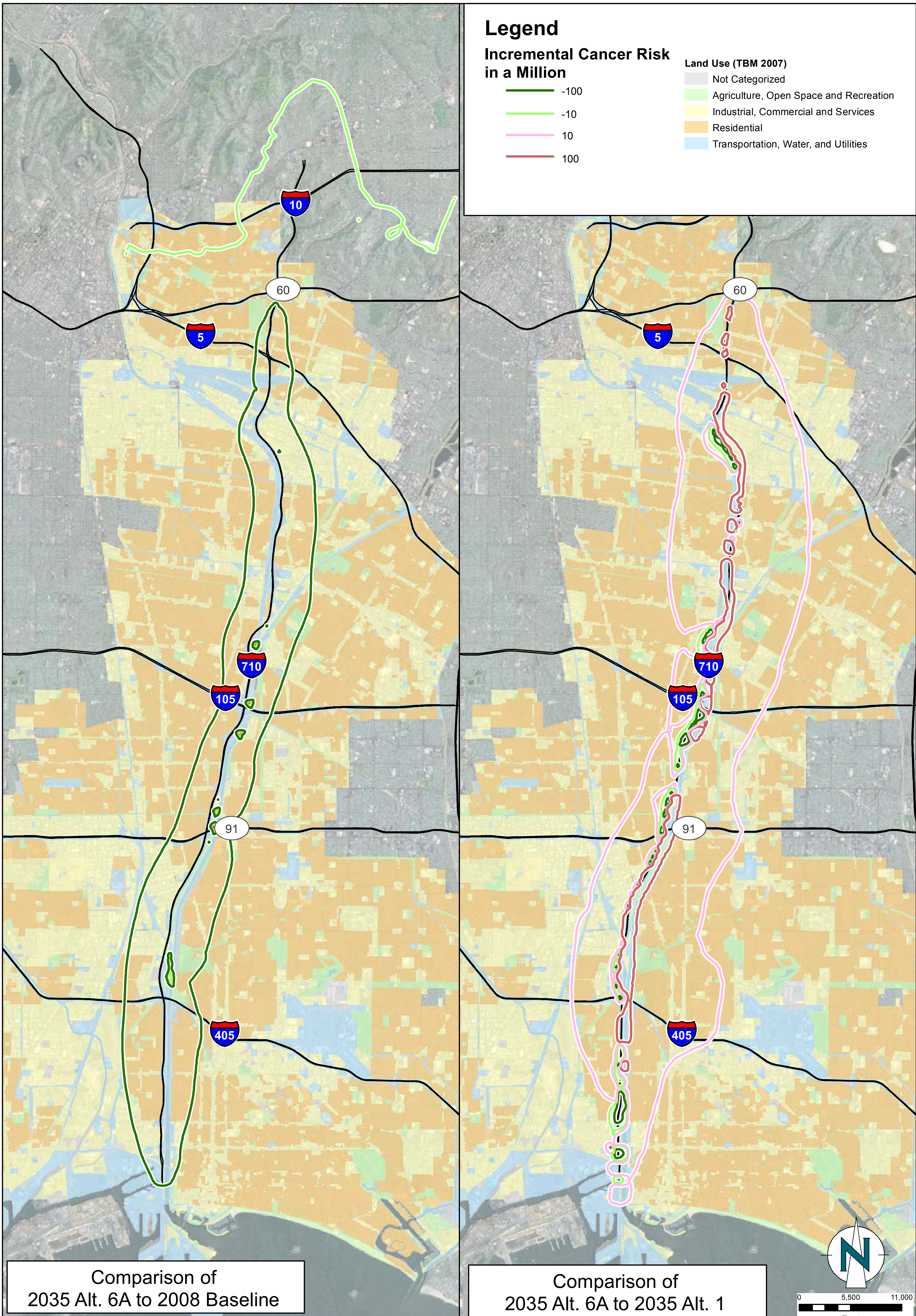
Date: 1/30/2012

2035 Alternative 5A
Incremental Cancer Risk in a Million
(Residential Scenarios)

Figure
4.45

PROJECT: 05-18574E4



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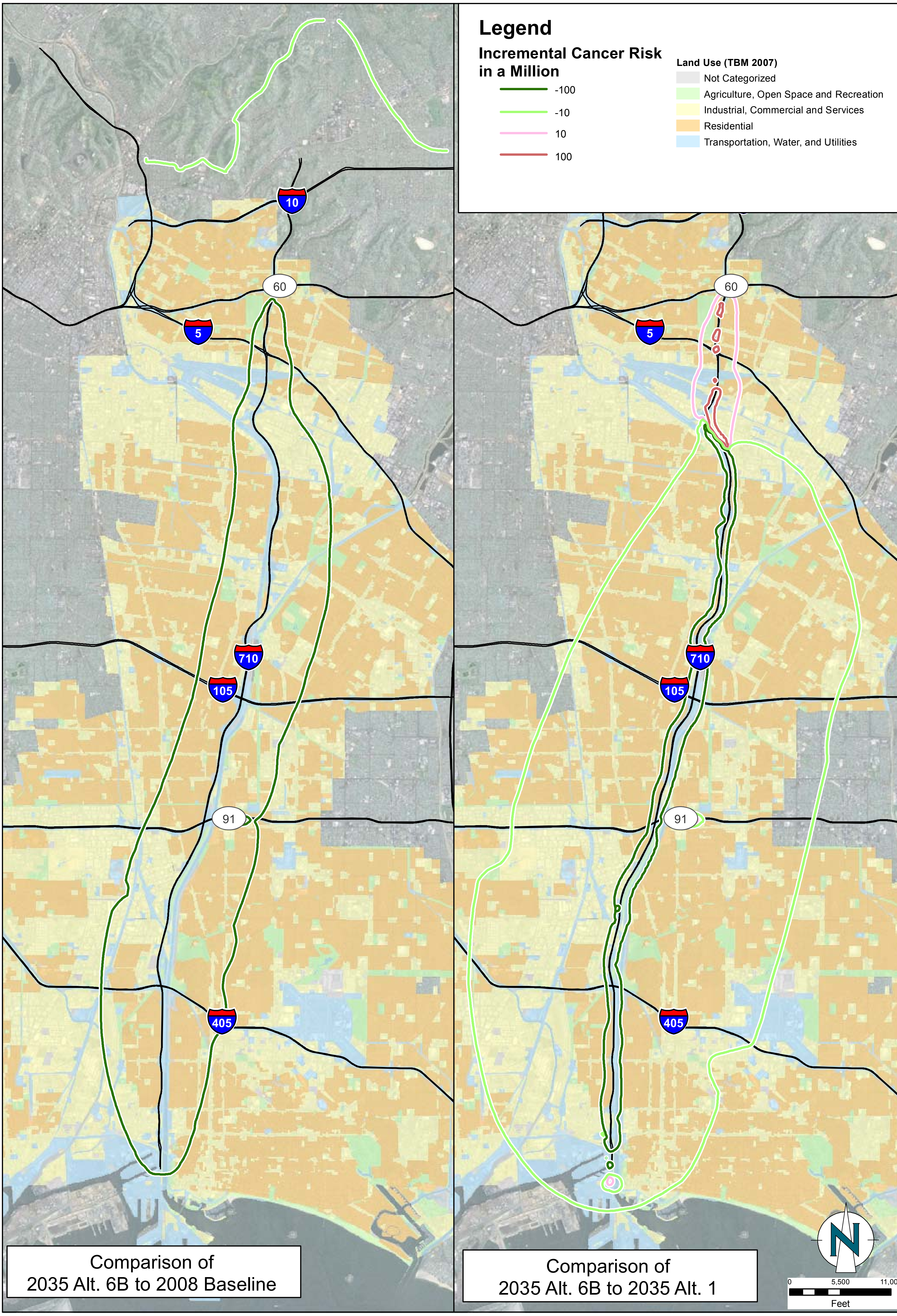
Date: 1/30/2012

2035 Alternative 6A
Incremental Cancer Risk in a Million
(Residential Scenarios)

Figure
4.46

PROJECT: 05-18574E4



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ENVIRON	2035 Alternative 6B Incremental Cancer Risk in a Million (Residential Scenarios)	Figure 4.47
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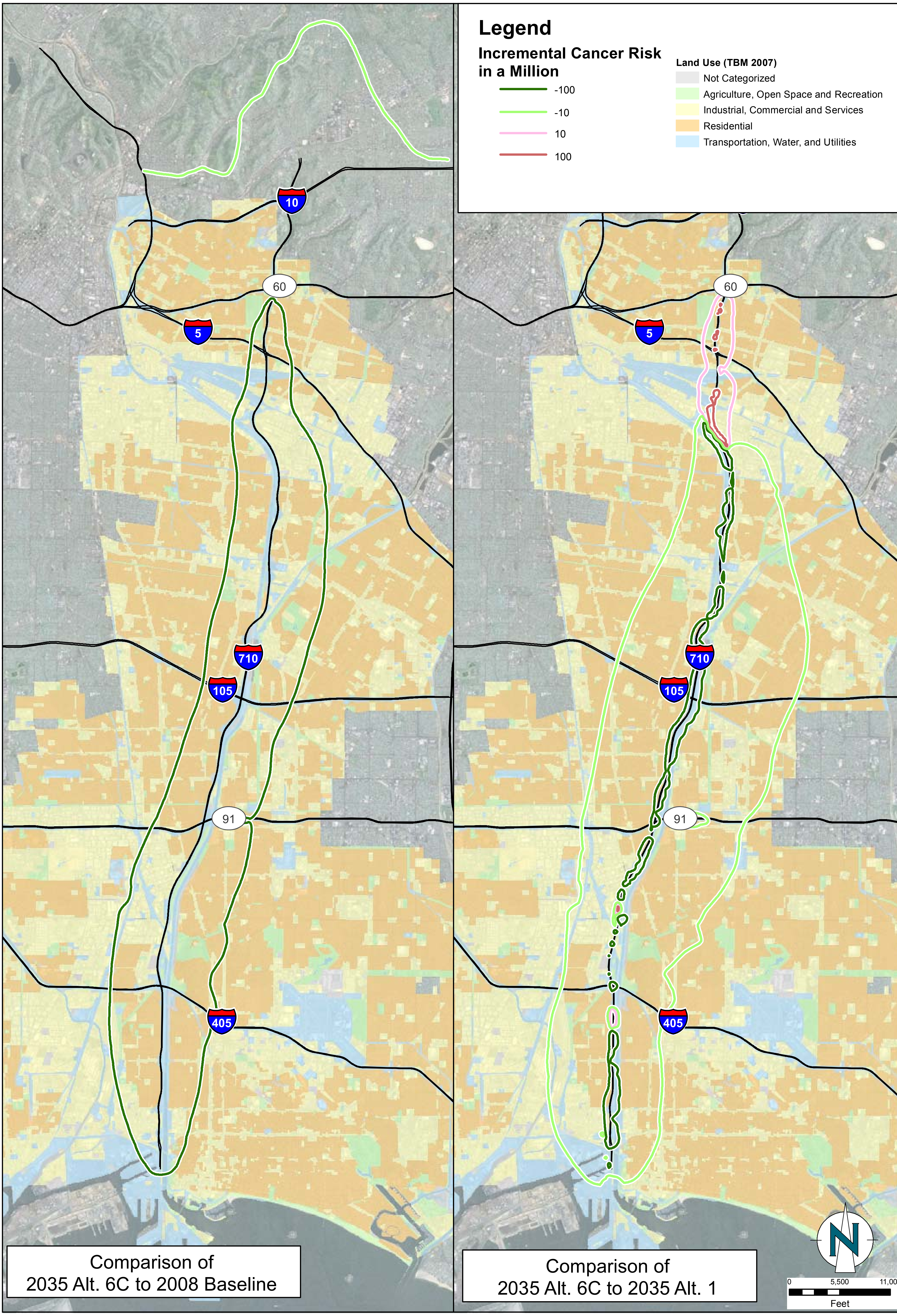

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ENVIRON

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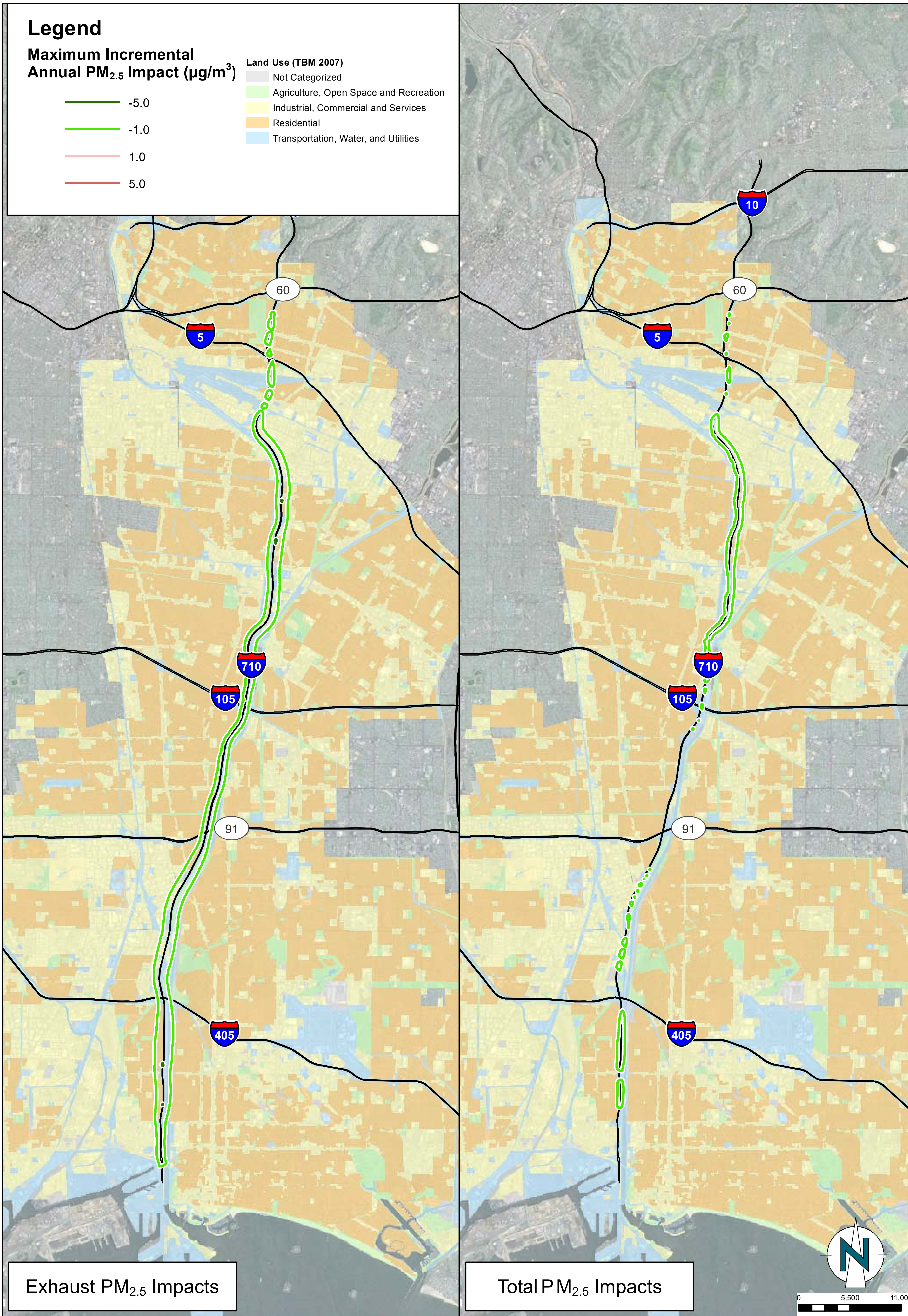
Date: 1/30/2012

2035 Alternative 6C
Incremental Cancer Risk in a Million
(Residential Scenarios)

Figure
4.48

PROJECT: 05-18574E4



ENVIRON

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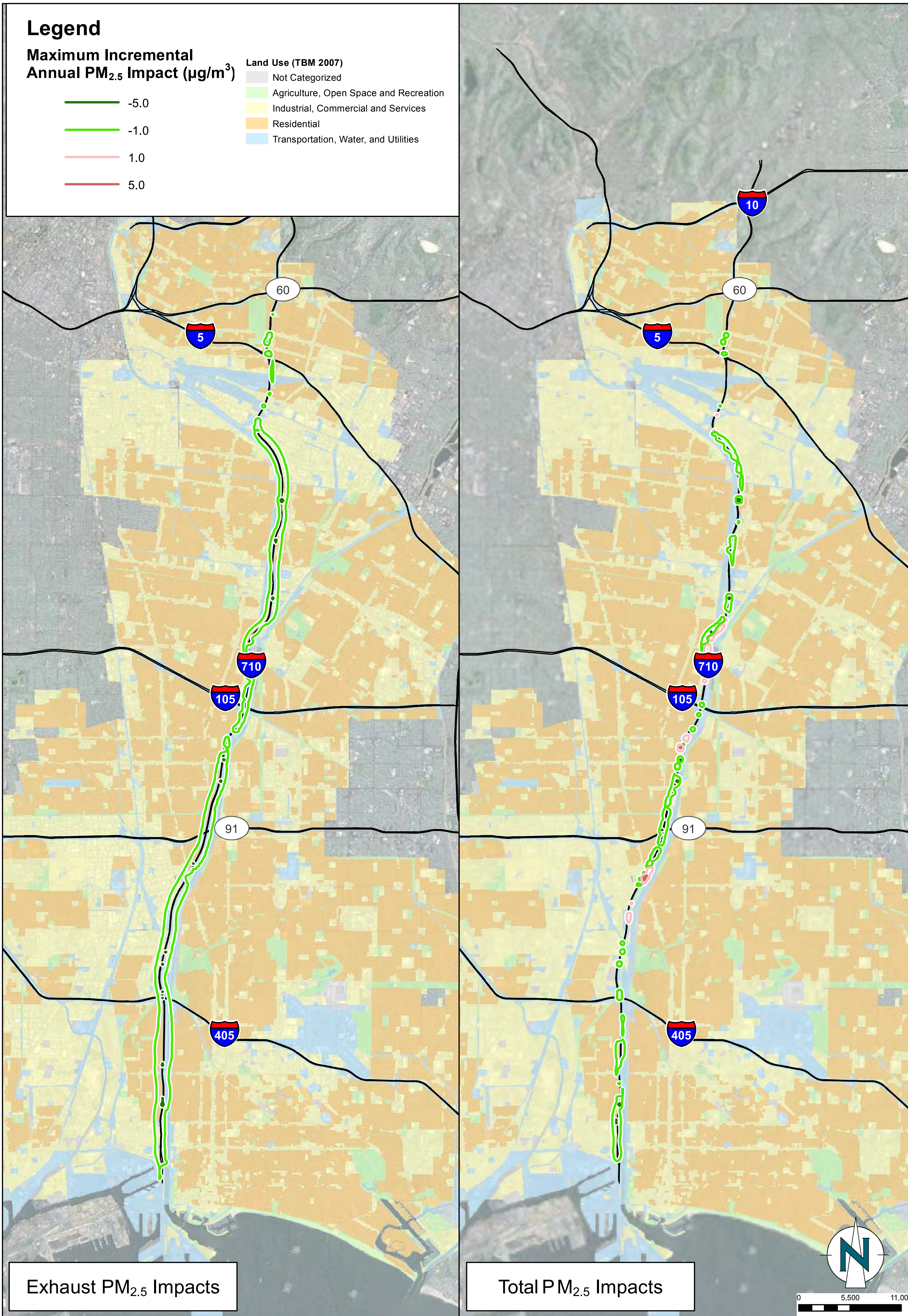
Comparison of
2035 Alternative 1 to 2008 Baseline
Maximum Incremental Annual $PM_{2.5}$ Impacts

Figure
4.49

PROJECT: 05-18574E4



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ENVIRON

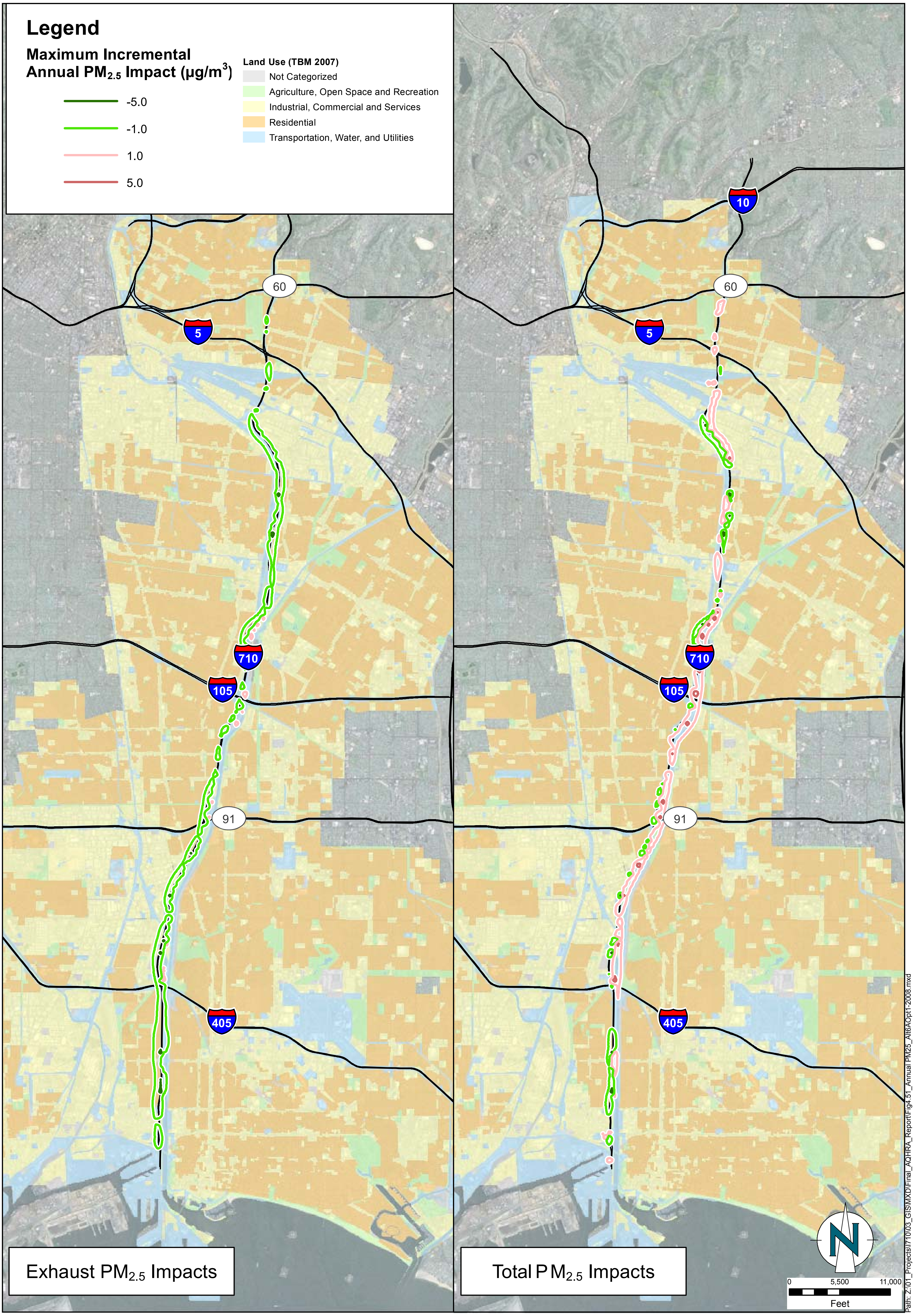
DRAFTED BY: MMM

Date: 1/27/2012

Comparison of
2035 Alternative 5A to 2008 Baseline
Maximum Incremental Annual $PM_{2.5}$ Impacts

Figure
4.50

PROJECT: 05-18574E4



ENVIRON

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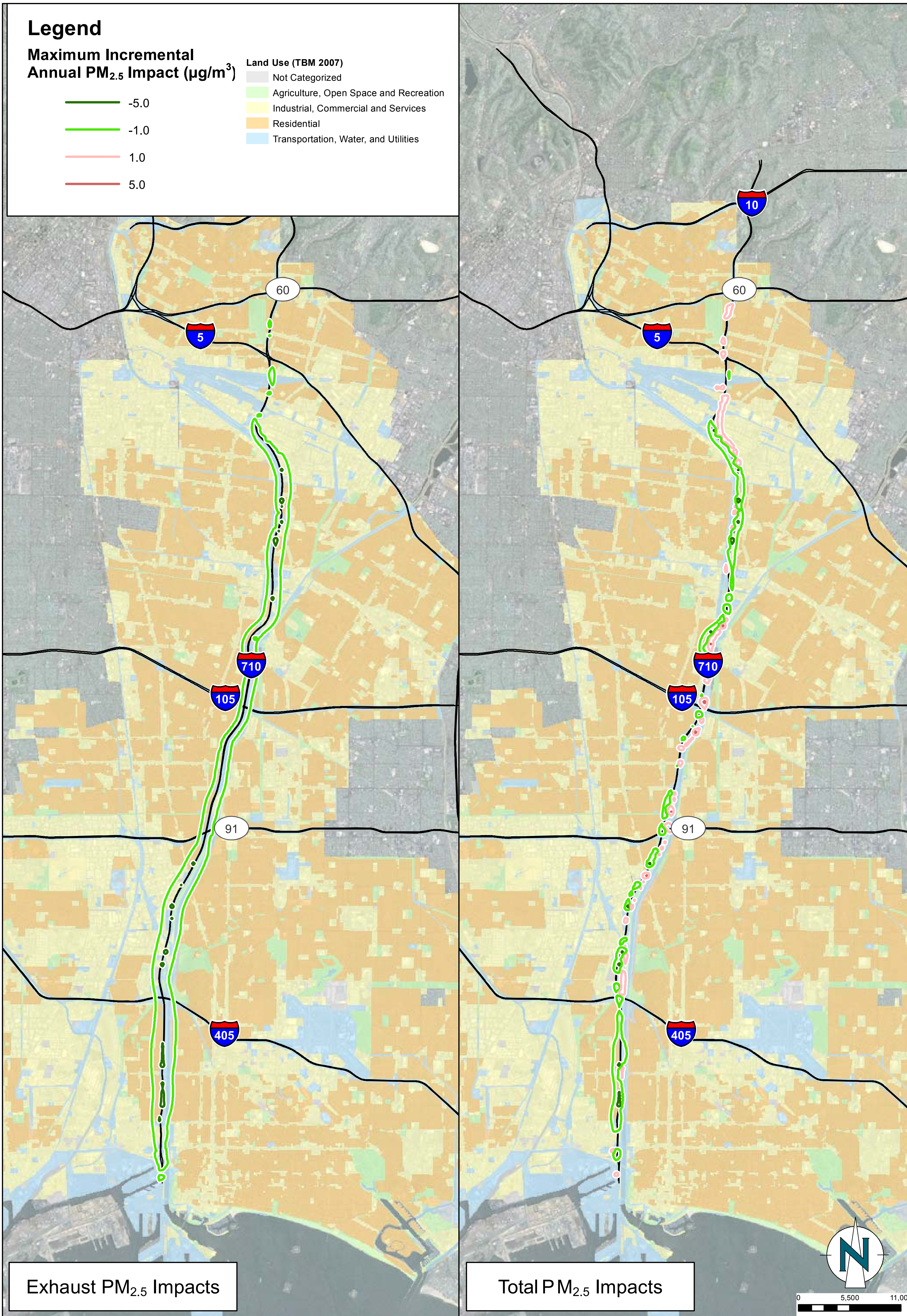
Comparison of 2035 Alternative 6A to 2008 Baseline Maximum Incremental Annual $PM_{2.5}$ Impacts

Figure 4.51

PROJECT: 05-18574E4



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ENVIRON

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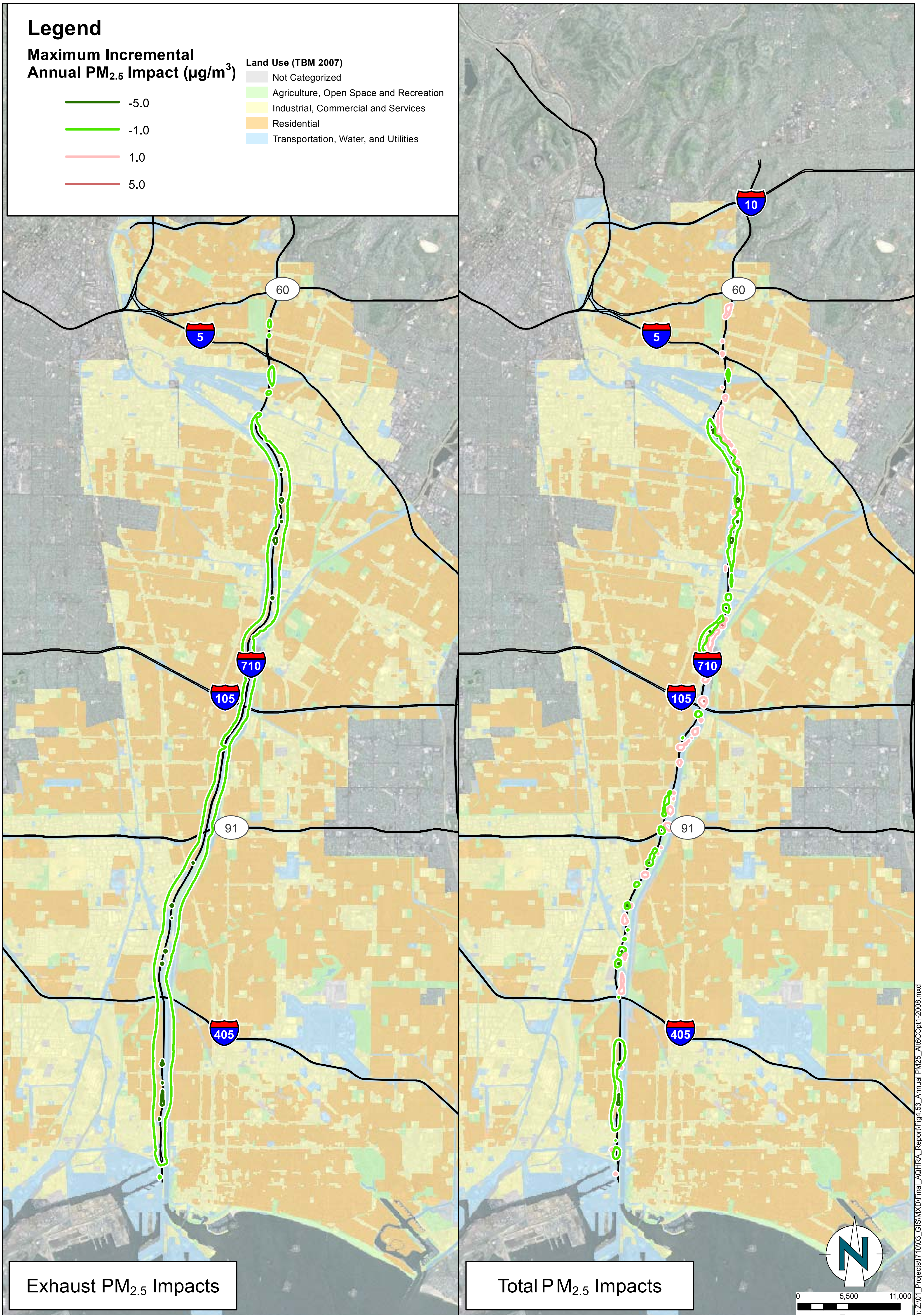
Comparison of
2035 Alternative 6B to 2008 Baseline
Maximum Incremental Annual $PM_{2.5}$ Impacts

Figure
4.52

PROJECT: 05-18574E4



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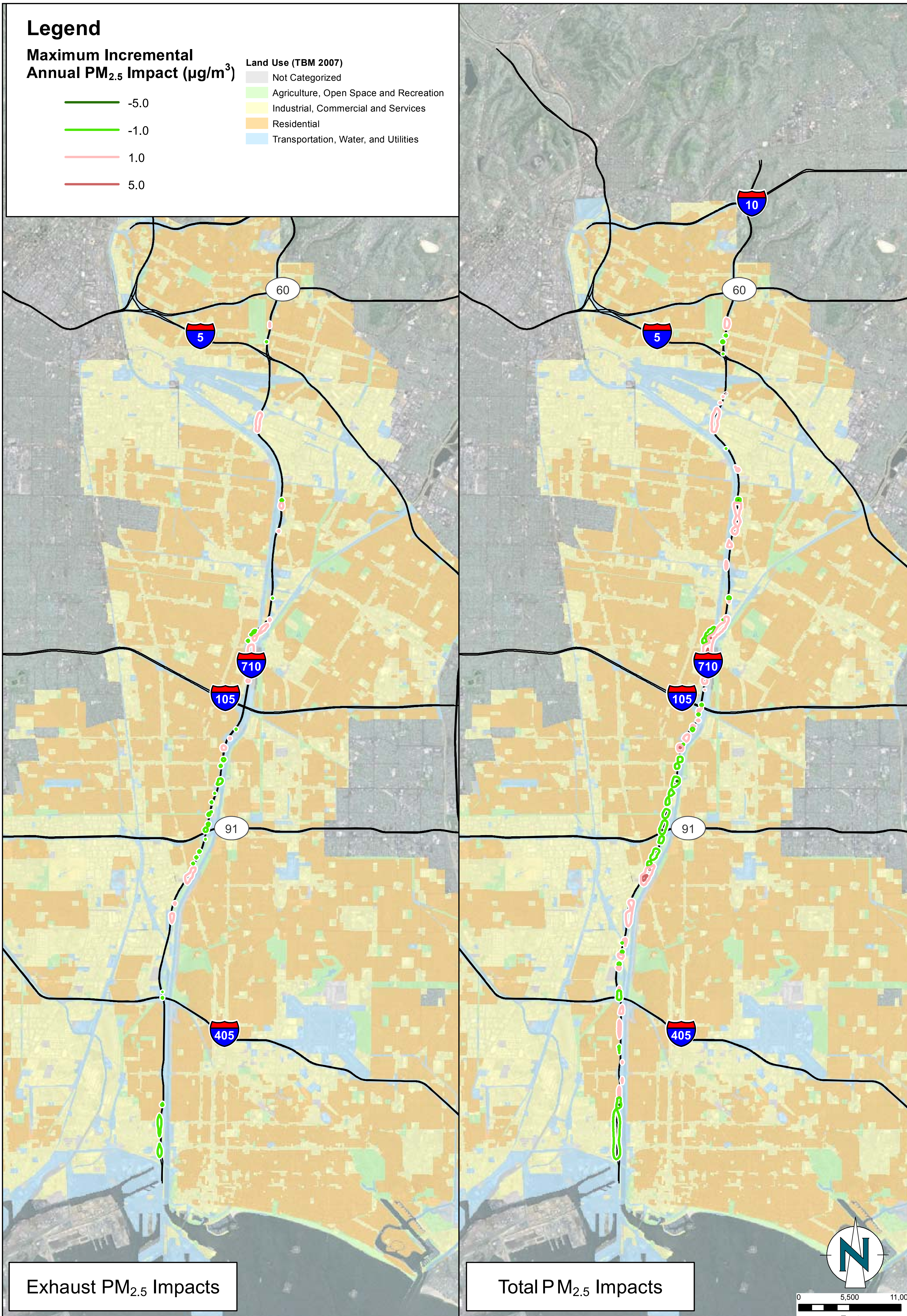
Comparison of 2035 Alternative 6C to 2008 Baseline Maximum Incremental Annual $PM_{2.5}$ Impacts

Figure 4.53

PROJECT: 05-18574E4



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ENVIRON

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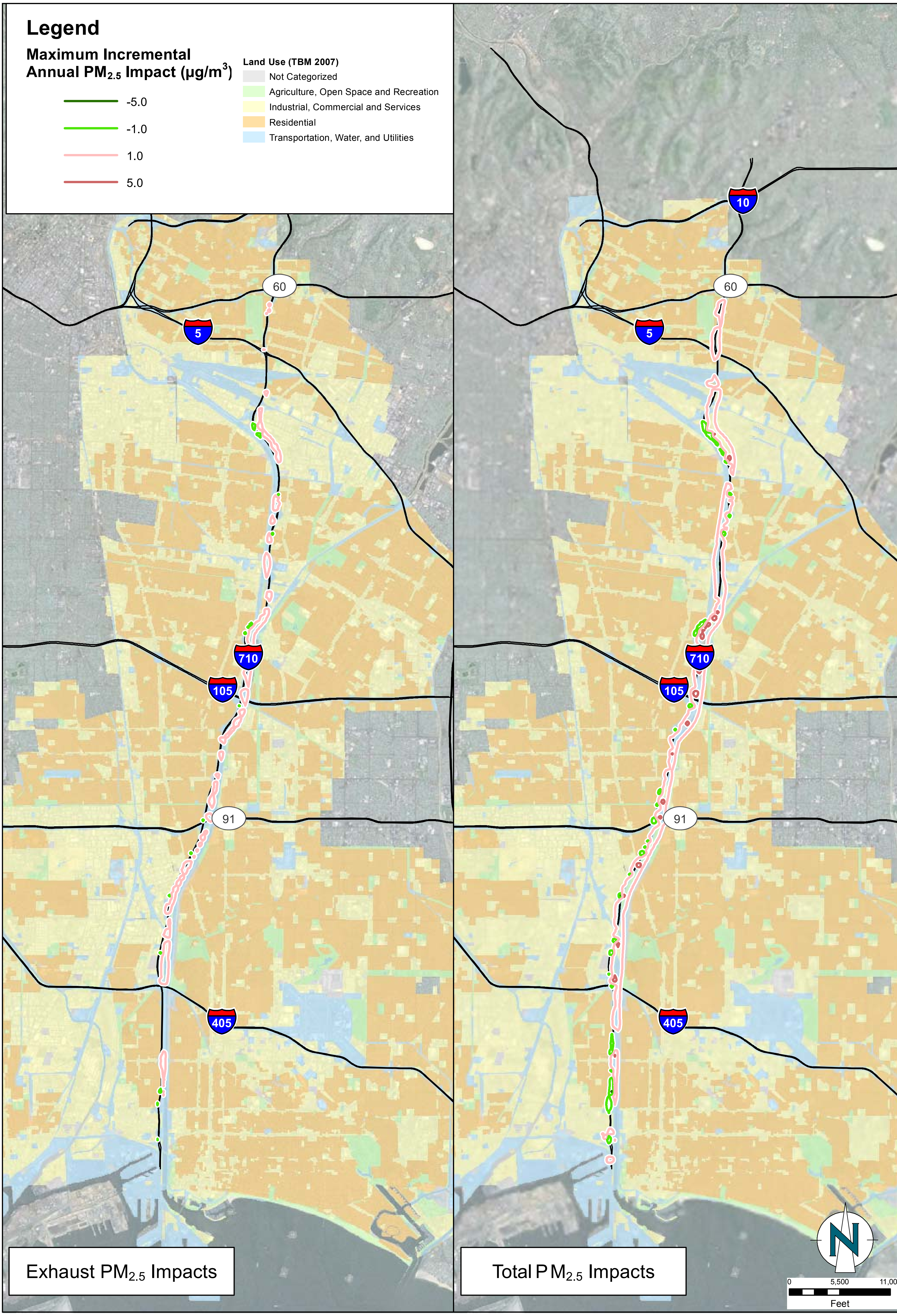
Comparison of
2035 Alternative 5A to 2035 Alternative 1
Maximum Incremental Annual $PM_{2.5}$ Impacts

Figure
4.54

PROJECT: 05-18574E4



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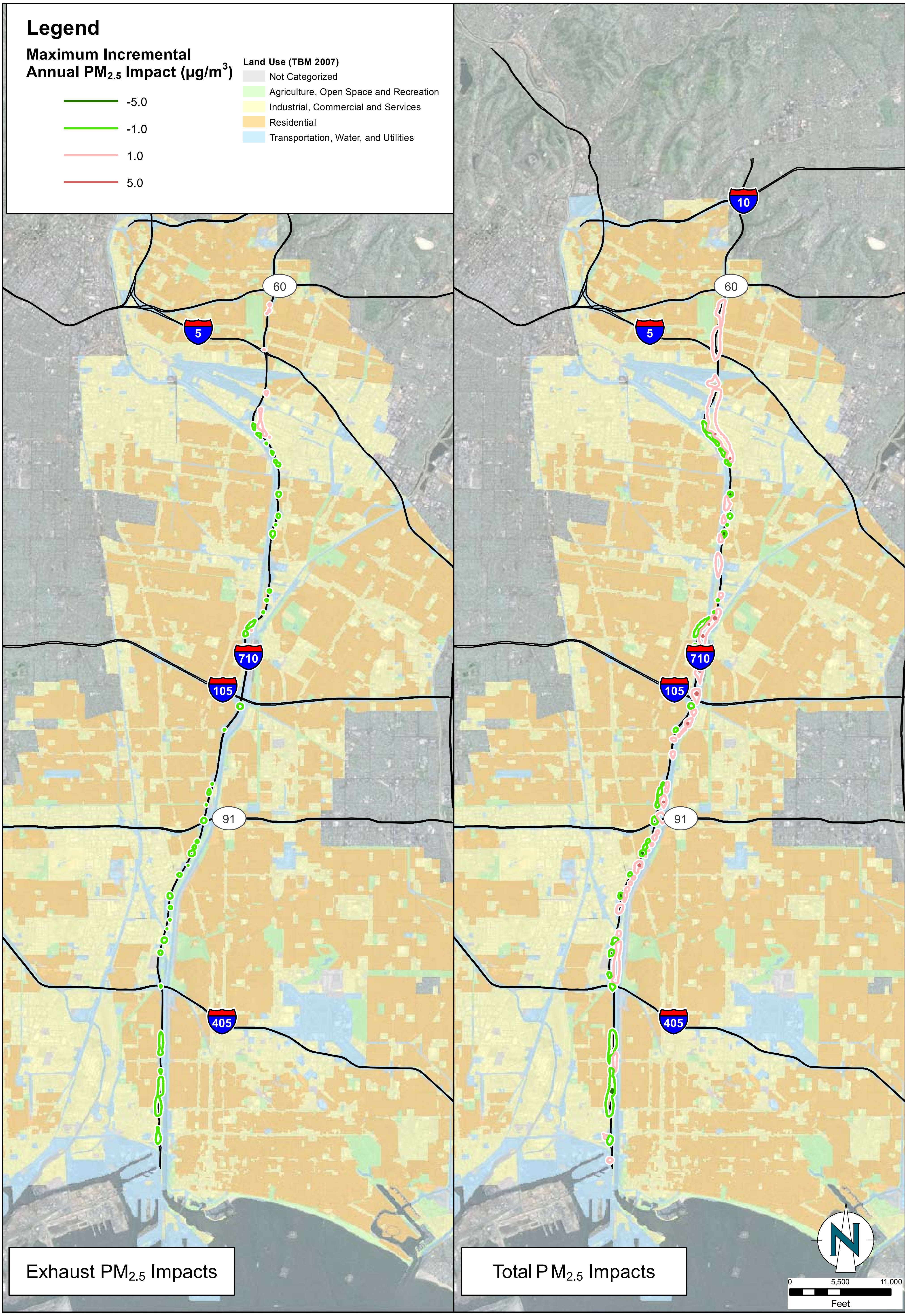
DRAFTED BY: SD

Date: 1/27/2012

Comparison of 2035 Alternative 6A to 2035 Alternative 1 Maximum Incremental Annual $PM_{2.5}$ Impacts

Figure 4.55

PROJECT: 05-18574E4



ENVIRON

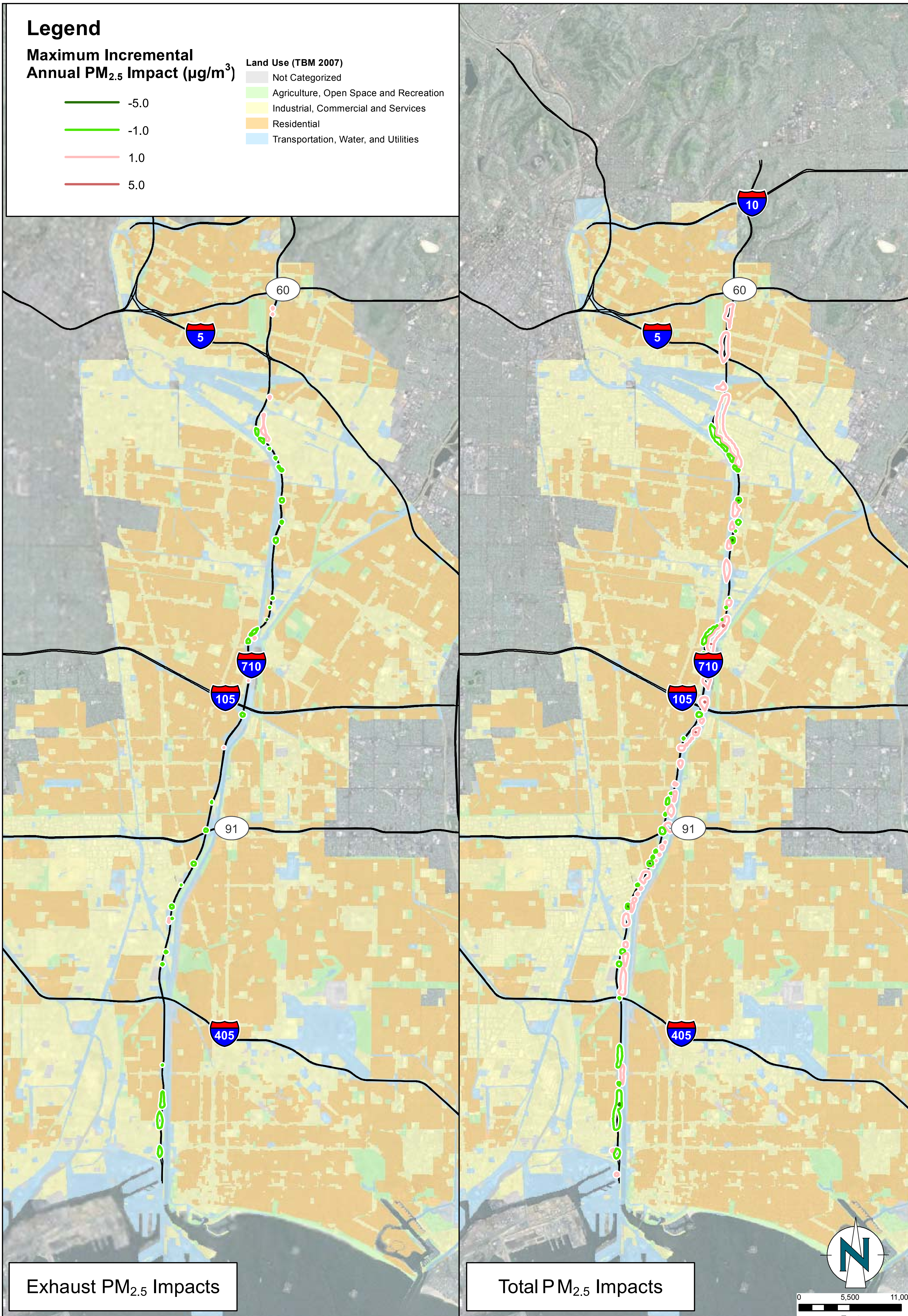
DRAFTED BY: MMM

Date: 1/27/2012

Comparison of
2035 Alternative 6B to 2035 Alternative 1
Maximum Incremental Annual $PM_{2.5}$ Impacts

Figure
4.56

PROJECT: 05-18574E4



ENVIRON

DRAFTED BY: SD | Date: 1/27/2012

Comparison of
2035 Alternative 6C to 2035 Alternative 1
Maximum Incremental Annual $PM_{2.5}$ Impacts

Figure 4.57

PROJECT: 05-18574E4

Appendix A

Protocol for the Air Quality and Health Risk Assessments

The draft AQ/HRA Protocol was released to the Funding Partners in March 2009. Comments were received and incorporated into April 2010 version of the AQ/HRA Protocol, which is presented here as Appendix A without further modification. Methodologies in the AQ/HRA technical study generally followed what has presented in the April 2010 Protocol with the exception of the AP-42 method for estimating the paved road entrained dust emissions. USEPA published a revised AP-42 method in January 2011, which is used in the technical study.

Protocol for the Air Quality and Health Risk Assessments (AQ/HRA)

for the I-710 Corridor Environmental Impact Report / Environmental Impact Statement

Prepared for:
URS Corporation
Santa Ana

Prepared by:
ENVIRON International Corporation
Irvine and Los Angeles, California

Date:
April 2010

Project or Version Number:
05-18574A10

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Glossary of Terms

AADT	Annual Average Daily Traffic
AB2588	Assembly Bill 2588 Air Toxics "Hot Spots" Information and Assessment Act of 1987
AB 32	Assembly Bill 32 Global Warming Solutions Act of 2006
AER	Annual Emission Report
AERMET	AERMOD Meteorological Preprocessor
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AERSURFACE	AERMOD pre-processor that develops parameters to characterize land use
AG	Attorney General
AQ/HRA	Air Quality and Health Risk Assessments
AQMP	Air Quality Management Plans
BSFC	Brake-Specific Fuel Consumption
CAAP	Clean Air Action Plan
CAAQS	California Ambient Air Quality Standards
CALINE	California Line Source Model
CARB (ARB)	California Air Resource Board
CCAR	California Climate Action Registry
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
COPC	Chemicals of Potential Concern
CPF	Cancer Potency Slope Factors
DEM	Digital Elevation Maps
DPM	Diesel Particulate Matter
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMFAC	Emission Factors Model
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration
gal	Gallon
GCCOG	Gateway Cities Council of Governments
GHG	Greenhouse Gas
GIS	Geographic Information Systems
g/mi	Grams per mile
GRP	General Reporting Protocol
GWP	Global Warming Potential
HARP	Hotspots Analysis Reporting Program

Glossary of Terms

HC	Hydrocarbons
HDT	Heavy Duty Trucks
hp	Horsepower
HQ	Hazard Quotient
hr	Hour
IPCC	International Panel on Climate Change
ISCST3	Industrial Source Complex Short Term Model
kg	Kilograms
km	Kilometer
lb	Pounds
LPS	Locally Preferred Strategy
LST	Localized Significance Thresholds
MATES	Multiple Air Toxics Exposure Study
Metro	Los Angeles County Metropolitan Transportation Authority
MMBTU	Million British Thermal Units
MOVES	Motor Vehicle Emission Simulator
MSA	Metropolitan Statistical Area
MSAT	Mobile Source Air Toxics
MWh	Megawatt Hour
NAAQS	National Ambient Air Quality Standards
NCDC	National Climatic Data Center
NEPA	National Environmental Policy Act
NLCD	National Land Cover Dataset
N_2O	Nitrous oxide
NO_2	Nitrogen dioxide
NO_X	Oxides of Nitrogen
NWS	National Weather Service
OAQPS	Office of Air Quality Planning and Standards
OEHHA	Office of Environmental Health Hazard Assessments
OPR	Office of Planning and Research
POLA	Port of Los Angeles
POLB	Port of Long Beach
PM	Particulate Mater
PRIME	Plume Rise Model Enhancements
REL	Reference Exposure Levels
ROG	Reactive Organic Gas
SB	Senate Bill
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments

Glossary of Terms

SCAQMD	South Coast Air Quality Management District
SCRAM	Support Center for Regulatory Air Models
SER	Standard Environmental Reference
SIP	State Implementation Plan
SO_2	Sulfur dioxides
SO_4	Sulfates
TAC	Toxic Air Contaminants
TDM	Transportation Demand Management
TOG	Total Organic Gases
TSM	Transportation Systems Management
URBEMIS	Urban Emissions Model
URF	Unit Risk Factors
USEPA (EPA)	United States Environmental Protection Agency
USGS	United States Geological Survey
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

Executive Summary

ES.1 Background

The Interstate 710 (I-710, also known as the Long Beach Freeway) is a major north-south interstate freeway linking the Port of Los Angeles (POLA) and the Port of Long Beach (POLB) to Southern California and beyond. The I-710 Major Corridor Study (MCS), undertaken to address the I-710 capacity and mobility issues and to explore possible solutions for transportation improvements, was completed in March 2005 and identified a Locally Preferred Strategy (LPS) consisting of ten general purpose lanes next to four separated freight movement lanes. The Los Angeles County Metropolitan Transportation Authority (Metro), in a cooperative effort involving California Department of Transportation (Caltrans), the Gateway Cities Council of Governments (GCCOG), the Southern California Association of Governments (SCAG), the POLA, the POLB, and the I-5 Joint Powers Authority (JPA), are collectively known as the I-710 Corridor Project Funding Partners. They are overseeing the preparation of environmental analysis and documentation for the proposed I-710 Corridor Project (improvements along the I-710 Corridor from Ocean Boulevard in the City of Long Beach to State Route 60 [SR-60] in East LA). The Air Quality / Health Risk Assessments (AQ/HRA) Working Group, comprised of Funding Partner representatives, oversaw the development of this I-710 Corridor Project AQ/HRA Protocol. In addition, an Agency Air Technical Working Group (or AATWG), comprised of representatives from the U.S. Environmental Protection Agency (USEPA), California Air Resources Board (CARB), South Coast Air Quality Management District (SCAQMD), Federal Highways Administration (FHWA), Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA), U.S. Army Corps of Engineers, Los Angeles District, as well as Funding Partner representatives, was consulted during the preparation of the draft I-710 AQ/HRA Protocol. Briefings were made to the Environmental Subject Working Group, Corridor Advisory Committee, Technical Advisory Committee, and Project Committee. The draft I-710 AQ/HRA Protocol was released for comments in March 2009.

The purpose[1] of the proposed I-710 Corridor Project (also referred to as the Project or I-710 Project) is to:

- Improve air quality and public health
- Improve traffic safety
- Address design deficiencies
- Address projected traffic volumes
- Address projected growth in population, employment, and activities related to goods movement

[1] A full description of the Need and Purpose of the I-710 Corridor Project can be found in the Notice of Preparation (http://www.metro.net/projects_studies/I710/images/710_NOP.pdf) and the I-710 Major Corridor Study Final Report (http://www.metro.net/projects_programs/final_report.htm)

The general I-710 Corridor Project study area will include the portion of the I-710 from Ocean Boulevard in Long Beach to SR-60, a distance of approximately 18 miles. Specific study areas may be established for individual analyses. For example, the traffic study area for the Project currently extends one mile east and west of the I-710 and includes freeway to freeway interchanges at I-405, SR-91, I-105, and I-5. Additionally, the traffic study examines intersections and roadway segments of key north/south and east/west arterials from Wilmington Avenue in the west to Lakewood Boulevard in the east.[2] For the AQ/HRA, the AERMOD dispersion model and a coarse receptor grid will be used to determine the zone of impact, which becomes the general AQ/HRA study area.

The environmental impacts of the proposed Project will be assessed and disclosed in compliance with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Caltrans (the lead agency[3]) and Metro have initiated work on the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the proposed Project, the purpose of which is to inform the public and governmental decision-makers of possible environmental effects associated with the proposed Project and to describe the measures that would be undertaken to mitigate those effects. The EIR/EIS will include an evaluation of the incremental air quality and health risk impacts associated with the proposed Project and Project alternatives compared to baseline conditions (i.e., 2008 Notice of Preparation baseline for CEQA or 2035 No Federal Action baseline for NEPA). In addition, a transportation conformity analysis for specific pollutants will be conducted to comply with federal and state transportation conformity requirements.[4] A Glossary has been included (see page iv) for the acronyms and technical terms used throughout this Protocol.

ES.2 Air Quality / Health Risk Assessments

In support of the EIR/EIS and transportation conformity determination, ENVIRON will be conducting air quality and health risk assessments (AQ/HRA) to evaluate the incremental air quality and human health risk impacts associated with the proposed Project and Project alternatives as compared to the baselines. The AQ/HRA for this Project will consist of two parts (i.e., two reports), meeting two separate regulatory requirements:

1. An analysis for the EIR/EIS document, consistent with CEQA/NEPA requirements
2. An analysis to support a transportation conformity determination, consistent with federal and state transportation conformity requirements

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[2] Freeway Traffic Operations Analysis Report (Draft); Prepared for Los Angeles County Metropolitan Transportation Authority; Prepared by URS; December 2, 2009.

[3] Caltrans is the lead agency under CEQA. Under NEPA, the Federal Highway Administration's (FHWA's) responsibility for environmental review, consultation, and any other action required in accordance with applicable federal laws for this project is being carried out by Caltrans under its assumption of responsibility pursuant to 23 United States Code (USC) 327.

[4] 40 CFR 93, Subpart A: Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects Developed, Funded or Approved Under Title 23 U.S.C. or the Federal Transit Laws.

A white paper[5] on project level and cumulative air quality/health risk assessments for the I-710 Project has been prepared by ENVIRON and circulated within the I-710 AQ/HRA Working Group. Methodologies used for the AQ/HRA and results will be presented in the AQ/HRA Reports.

ES.3 Pollutants of Concern

The pollutants of concern include criteria pollutants (including, but not limited to, ozone and small airborne particulate matter and their precursors[6]) and toxic air pollutants (including, but not limited to, diesel particulate matter [DPM]). Table ES-1 describes these pollutants, their precursors, and related health effects.

Table ES-1. Pollutants of Concern, Their Precursors, and Related Health Effects [7]

Pollutant	Health Effects
$PM_{2.5}$ and PM_{10} In addition to directly emitted particulates, oxides of nitrogen (NO_x), oxides of sulfur (SO_x) are precursors of $PM_{2.5}$ and PM_{10}.	Respirable particulates ($PM_{2.5}$ and $PM_{10)}$ pose a serious health hazard, alone or in combination with other pollutants. More than half of the smallest particles inhaled get deposited in the lungs and can cause permanent lung damage. Respirable particles have been found to increase morbidity and mortality via the following adverse health effects: decreased lung function, aggravated asthma, exacerbation of lung and heart disease symptoms, chronic bronchitis and irregular heartbeats. In addition, respirable particles can act as a carrier of absorbed toxic substance[8].
Ozone Ozone is not a directly emitted pollutant from project sources; volatile organic compounds (VOCs) and NOx are precursors of ozone.	Elevated ozone concentrations have been shown to induce airway irritation, cause airway inflammation, induce wheezing and difficulty breathing, aggravate preexisting respiratory conditions such as asthma, and can lead to permanent lung damage after repeated exposure to elevated concentrations9
Carbon Monoxide (CO)	Carbon monoxide is a colorless and odorless gas that is known to cause aggravation of various aspects of coronary heart disease, dizziness, fatigue, impairment to central nervous system functions, and possible increased risk to fetuses.
Sulfur Dioxide (SO_2)	Sulfur dioxide is known to cause irritation in the respiratory tract, shortness of breath, and can injure lung tissue when combined with fine PM. It also reduces visibility and the level of sunlight.

[5] White Paper (Revised Draft); Project-Level and Cumulative Air Quality/Health Risk Assessments for the I-710 Project; Prepared for the I-710 AQ/HRA Working Group by ENVIRON International Corporation.
[6] Precursors interact in the atmosphere under specific conditions to form secondary criteria pollutants such as ozone and aerosol $PM_{2.5}/PM_{10}$.
[7] SCAQMD Final 2007 Air Quality Management Plan, June 2007, (http://www.aqmd.gov/aqmp/07aqmp/aqmp/Complete_Document.pdf).
[8] EPA National Center for Environmental Assessment, particle pollution health effects http://www.epa.gov/air/particlepollution/health.html.
[9] EPA National Center for Environmental Assessment, ground level ozone health effects http://www.epa.gov/air/ozonepollution/health.html.

Table ES-1. Pollutants of Concern, Their Precursors, and Related Health Effects [7]

Pollutant	Health Effects
Nitrogen Dioxide (NO_2)	Long-term exposure to nitrogen dioxide has the potential to decrease lung function and worsen chronic respiratory symptoms and diseases in sensitive population. It has also been associated with cardiopulmonary mortality and emergency room asthma visits. USEPA recently adopted a 1-hour federal standard to address short-term exposure impacts (e.g., adverse respiratory effects) near major roadways.
Air Toxics	Air toxics may have both chronic (cancer and non-cancer) and acute impacts. USEPA has identified a list of 21 mobile source air toxics (MSATs)[10], of which six are classified as priority MSATs: acetaldehyde, acrolein, benzene, 1,3-butadiene, diesel particulate matter and diesel exhaust organic gases, and formaldehyde.

ES.4 Scope of AQ/HRA

It should be noted that the AQ/HRA performed for any projects under CEQA/NEPA are conducted for the changes (i.e., increments) in project-related emissions, air quality impacts, and health risks relative to a baseline condition. Therefore, identifying the baseline condition is an important step in the EIR/EIS process. Furthermore, it is important to note that the definition of baseline differs under CEQA and NEPA as discussed below:

The CEQA Baseline represents existing, current conditions, defined to be the conditions at the time the Notice of Preparation (NOP) was released. Therefore, the CEQA baseline will represent project-specific conditions in the year 2008 (e.g., traffic conditions on the I-710 and selected roadways in the year 2008).

The NEPA Baseline represents conditions in the 2035 ‘analysis’ year and in the case where no federal funds were used for the Project. In this case, the “No Build” alternative in the year 2035 (also known as Alternative 1) will represent the NEPA baseline.

The CEQA/NEPA AQ/HRA will evaluate the Project and the identified Project alternatives compared to these baselines. The Alternative Screening process for this Project recommended that the following three build alternatives be evaluated by the AQ/HRA:[11]

Alternative 5A – Ten General Purpose Lanes;

[10] In March 2001, EPA issued its first MSATs rule, 40 CFR Parts 80 and 86 - Control of Emissions of Hazardous Air Pollutants From Mobile Sources; Final Rule, March 2001 (http://www.epa.gov/EPA-AIR/2001/March/Day-29/a37.htm), which identified 21 MSATs as being hazardous air pollutants that required regulation. A subset of six MSATs was identified as having the greatest influence on human health. In February 2007 EPA issued a second MSATs rule, which generally supported the findings in the first rule and recommended that acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter as having the greatest influence on health. As agreed on by the AQ/HRA Working Group and the Agency Air Technical Working Group (AATWG), the I-710 AQ/HRA will evaluate the six priority MSATs identified in the first MSATs rule.

[11] Technical Memorandum – Alternatives Screening Analysis (Final); Prepared for Los Angeles County Metropolitan Transportation Authority; Prepared by URS; May 29, 2009.

Alternative 6A – Alternative 5A with the Addition of Four Separate Freight Movement Lanes

- Alternative 6B – Alternative 6A with Zero Emission Trucks in the Freight Corridor

The project level conformity analyses will consist of a quantitative "hot-spot" analysis for CO and a qualitative "hot-spot" analysis for PM_{10} and $PM_{2.5}$. The quantitative "hot-spot" analysis for CO will involve estimating the incremental concentration of CO for the project alternatives as compared to the baseline and adding it to the background concentration of CO to determine conformity. At this time, federal and state guidelines call for a qualitative "hot-spot" analysis for PM_{10} and $PM_{2.5}$, although ENVIRON understands that USEPA will likely be releasing a guidance for PM_{10} and $PM_{2.5}$ quantitative analyses sometime in 2010. The conformity analyses will be revised to reflect changes in federal and state guidelines if they occur during the AQ/HRA development process.

The following analyses will be carried out in support of the EIR/EIS (Note that the methods to be used for these analyses are discussed in detail in the main Protocol document, Chapter 3):

Incremental traffic emissions analysis for project alternatives compared to the baselines: The increase in emissions for the criteria pollutants (PM_{10}, $PM_{2.5}$, CO, SO_2, NO_2), ROG (a precursor to ozone), six priority MSATs, and greenhouse gases for the project alternatives as compared to the baselines will be estimated.

Incremental traffic-related air quality impacts for project alternatives compared to the baselines: The increase in concentrations of criteria pollutants (air quality impacts) for the project alternatives as compared to the baselines will be estimated and reported in the AQ/HRA technical report.

Incremental traffic-related health risk assessment for project alternatives as compared to the baselines: The increase in health risk impacts for the six priority MSATs for alternatives as compared to the baselines will be estimated and reported in the AQ/HRA technical report.

Emission estimates for overall construction activities: The emissions for the criteria pollutants and greenhouse gases will be estimated for the estimated overall construction activities.

Cumulative impact analysis: The cumulative impact analysis will be done following the approach of listing and describing the past, present, and probable future projects in the vicinity of the proposed I-710 Corridor Project, which complies with CEQA requirements of reporting cumulative impacts from the Project. Due to the schedule delay on the I-5 Freeway's EIR/EIS process, it is unlikely that a quantitative cumulative analysis will be performed as part of the I-710 Project, as originally planned. GHG emissions will be discussed under cumulative impacts.

PM mortality: The EIR/EIS will also contain a qualitative discussion on potential mortality associated with exposure to PM emissions from the proposed alternatives as compared to the baselines.

Ultrafine particles: The EIR/EIS will contain a qualitative discussion on ultrafine particles (defined as particles with diameters less than 0.1 μm) and their associated health impacts for the various alternatives.

ES.5 Significance and Conformity Determinations

One important element of the CEQA/NEPA process is to discuss the significance of the project impacts. Lead agencies may choose to use certain numerical or performance-based thresholds for emissions, ambient concentrations, and/or health impacts against which to judge if a project's impacts are significant and potentially require mitigation. It should be noted that Caltrans does not typically use numerical significance thresholds for transportation projects' air quality and health risk impacts, except for project level conformity analyses where the project needs to demonstrate conformity with the federal Clean Air Act and the purpose of the State Implementation Plan. Caltrans has indicated that it will use (but not adopt) the significance thresholds from the South Coast Air Quality Management District (SCAQMD) for this Project as part of its overall significance determinations. The GHG evaluations and significance determinations in the AQ/HRA will be consistent with the revised CEQA Guidelines soon to become effective and in consultation with the lead agency.[12] .

ES.6 AQ/HRA Protocol

This Protocol is intended to inform all interested agencies and stakeholders of the planned technical approach to be used in the I-710 AQ/HRA such that any adjustments to the approach can be made early in the process and non-consensus on the final technical approach can be minimized. The Draft Protocol (released in March 2009) had been reviewed by the I-710 AQ/HRA Working Group and the Agency Air Technical Working Group for purposes of soliciting feedback and consensus. This version of the Protocol is intended to be final as ENVIRON has incorporated the comments (where appropriate) that it has received since April 2009.

Please refer to the following chapters in the main Protocol document for additional details:

See Chapter 2 for a discussion of CEQA and NEPA baselines used in calculating incremental project impacts;

See Chapter 3 for more information on the individual analyses and related technical approach;

See Chapters 4 and 5 for discussions on cumulative impact analysis and significance and conformity determination, respectively;

See Appendices for detailed information on the technical approach to calculating emissions, conducting local area air quality modeling, conducting conformity and related "hot-spot" modeling, and performing the health risk assessment.

[12] As mandated by SB 97, the CEQA Guidelines (Title 14, Division 6, Chapter 3, Section 15064 et. seq.) were amended. The Amendments are effective on March 18, 2010. (Adopted text is available from http://ceres.ca.gov/ceqa/docs/Adopted_Text_of_SB97_CEQA_Guidelines_Amendments.pdf).

1 Introduction

The Interstate 710 (I-710, also known as the Long Beach Freeway) is a major north-south interstate freeway linking the Port of Los Angeles (POLA) and Port of Long Beach (POLB) to Southern California and beyond. An essential component of the regional, statewide, and national transportation system, it serves both passenger and goods movement vehicles. As a result of population growth, cargo container growth, increasing traffic volumes, and aging infrastructure, the I-710 Freeway experiences serious congestion and safety issues. Moreover, the number of Heavy Duty Trucks (HDT) traveling along the I-710 Corridor has also increased, resulting in high levels of air pollution, particularly diesel particulate matter emissions, and other negative impacts to the communities near the I-710. As a result of this strain, I-710 is unable to accommodate current or future traffic demands.

In March 2005, the I-710 Major Corridor Study (MCS) was completed to address the I-710 capacity and mobility issues and to explore possible solutions for transportation improvements. The outcome of the MCS was a Locally Preferred Strategy (LPS) proposing ten general purpose lanes next to four separated freight movement lanes. The Los Angeles County Metropolitan Transportation Authority (Metro), in a cooperative effort involving California Department of Transportation (Caltrans), the Gateway Cities Council of Governments (GCCOG), the Southern California Association of Governments (SCAG), the POLA, the POLB, and the I-5 Joint Powers Authority (JPA), collectively known as the I-710 Corridor Project Funding Partners, formally proposed to improve the I-710 Corridor from Ocean Boulevard in the City of Long Beach to State Route 60 (SR-60) in East LA. The LPS is one of the possible alternatives for the proposed project design. The Air Quality / Health Risk Assessments (AQ/HRA) Working Group, comprised of Funding Partner representatives, oversaw the development of this I-710 Corridor Project AQ/HRA Protocol. In addition, an Agency Air Technical Working Group (or AATWG), comprised of representatives from the U.S. Environmental Protection Agency (USEPA), California Air Resources Board (CARB), South Coast Air Quality Management District (SCAQMD), Federal Highways Administration (FHWA), Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA), U.S. Army Corps of Engineers, Los Angeles District, as well as Funding Partner representatives, was consulted during the preparation of the draft I-710 AQ/HRA Protocol. Briefings were made to the Environmental Subject Working Group, Corridor Advisory Committee, Technical Advisory Committee, and Project Committee. The draft I-710 AQ/HRA Protocol was released for comments in March 2009.

The purpose of the proposed I-710 Corridor Project (Project or I-710 Project) is to:

- Improve air quality and public health
- Improve traffic safety
- Address design deficiencies
- Address projected traffic volumes

- Address projected growth in population and economic activities related to goods movement

The proposed Project will use state and federal funding and, therefore, requires compliance with both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Caltrans (the lead agency[13]) and Metro have initiated an Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the proposed Project, the purpose of which is to inform the public and governmental decision-makers of possible environmental effects associated with the Project and to describe the measures that would be undertaken to mitigate those effects. The EIR/EIS will include an evaluation of the incremental air quality and health risk impacts associated with the proposed Project and Project alternatives compared to baseline conditions (i.e., 2008 Notice of Preparation baseline for CEQA or 2035 No Federal Action baseline for NEPA, discussed in detail in Section 2.3). In addition, a transportation conformity analysis for specific pollutants will be conducted to comply with federal and state transportation conformity requirements. Therefore, the overall air quality and health risk assessments (AQ/HRA) for this project will consist of two parts:

1. An analysis for the EIR/EIS document to support significance determinations
2. An analysis to support a transportation conformity determination

The pollutants of concern to be analyzed in the EIR/EIS include criteria pollutants (including, but not limited to, small airborne particulate matter and ozone precursors[14]) and toxic air pollutants (including, but not limited to, diesel particulate matter [DPM]). Table 1-1 describes these pollutants, their precursors, and related health effects.

[13] Caltrans is the lead agency under CEQA. Under NEPA, the Federal Highway Administration's (FHWA) responsibility for environmental review, consultation, and any other action required in accordance with applicable federal laws for this project is being carried out by Caltrans under its assumption of responsibility pursuant to 23 United States Code (USC) 327.

[14] Precursors interact in the atmosphere under specific conditions to form secondary criteria pollutants such as ozone and aerosol PM2.5/PM10.

Table 1-1. Pollutants of Concern, Their Precursors, and Related Health Effects [15]

Pollutant	Health Effects
$PM_{2.5}$ and PM_{10} In addition to directly emitted particulates, oxides of nitrogen (NO_x), oxides of sulfur (SO_x) are precursors of $PM_{2.5}$ and PM_{10}.	Respirable particulates ($PM_{2.5}$ and PM_{10}) pose a serious health hazard, alone or in combination with other pollutants. More than half of the smallest particles inhaled get deposited in the lungs and can cause permanent lung damage. Respirable particles have been found to increase morbidity and mortality via the following adverse health effects: decreased lung function, aggravated asthma, exacerbation of lung and heart disease symptoms, chronic bronchitis and irregular heartbeats. In addition, respirable particles can act as a carrier of absorbed toxic substance.[16]
Ozone Ozone is not a directly emitted pollutant from project sources; volatile organic compounds (VOCs) and NO_x are precursors of ozone.	Elevated ozone concentrations have been shown to induce airway irritation, cause airway inflammation, induce wheezing and difficulty breathing, aggravate preexisting respiratory conditions such as asthma, and can lead to permanent lung damage after repeated exposure to elevated concentrations[17]
Carbon Monoxide (CO)	Carbon monoxide is a colorless and odorless gas that is known to cause aggravation of various aspects of coronary heart disease, dizziness, fatigue, impairment to central nervous system functions, and possible increased risk to fetuses.
Sulfur Dioxide (SO_2)	Sulfur dioxide is known to cause irritation in the respiratory tract, shortness of breath, and can injure lung tissue when combined with fine PM. It also reduces visibility and the level of sunlight.
Nitrogen Dioxide (NO_2)	Long-term exposure to nitrogen dioxide has the potential to decrease lung function and worsen chronic respiratory symptoms and diseases in sensitive population. It has also been associated with cardiopulmonary mortality and emergency room asthma visits. USEPA recently adopted a 1-hour federal standard to address short-term exposure impacts (e.g., adverse respiratory effects) near major roadways.
Air Toxics	Air toxics may have both chronic (cancer and non-cancer) and acute impacts. USEPA has identified a list of 21 mobile source air toxics (MSATs)[18], of which six are classified as priority MSATs: acetaldehyde, acrolein, benzene, 1,3-butadiene, diesel exhaust particulate matter and organics, and formaldehyde.

[15] SCAQMD Final 2007 Air Quality Management Plan, June 2007, (http://www.aqmd.gov/aqmp/07aqmp/aqmp/Complete_Document.pdf)
[16] EPA National Center for Environmental Assessment, particle pollution health effects http://www.epa.gov/air/particlepollution/health.html.
[17] EPA National Center for Environmental Assessment, ground level ozone health effects http://www.epa.gov/air/ozonepollution/health.html
[18] 40 CFR Parts 80 and 86 - Control of Emissions of Hazardous Air Pollutants From Mobile Sources; Final Rule, March 2001 (http://www.epa.gov/EPA-AIR/2001/March/Day-29/a37.htm). In February 2007 EPA issued a second MSATs rule, which generally supported the findings in the first rule and recommended that acrolein, benzene, 1,3-butadiene, DPM, formaldehyde, naphthalene, and polycyclic organic matter as having the greatest influence on health. As agreed on by the AQ/HRA Working Group and the Agency Air Technical Working Group (AATWG), the I-710 AQ/HRA will evaluate the six priority MSATs identified in the first MSATs rule.

This I-710 Project AQ/HRA Protocol (Protocol) describes the technical approach that will be used in the AQ/HRA. Caltrans, the lead review agency for the EIR/EIS, has published a Standard Environmental Reference (SER) document[19] that includes a chapter on air quality that will be used as primary guidance for the analyses. However, if suggested by other agencies and agreed upon by Caltrans and the agencies, ENVIRON will also perform additional analyses to evaluate additional air quality and health risk impacts from the proposed Project, which are discussed in detail in Chapter 3. It should be noted that some elements of the AQ/HRA are still evolving. New guidelines become available and new or updated methodologies become accepted by different agencies over time; hence, new elements will be included in the AQ/HRA if the methods and guidance documents are approved by the lead agency during the preparation of the EIR/EIS.

As noted above, this Project is a joint venture of several agencies associated with transportation and goods movement in the greater Los Angeles area. In addition, various other environmental and transportation agencies will have an interest in how the environmental impacts are assessed, in particular air quality; these agencies include the South Coast Air Quality Management District (SCAQMD), the California Air Resources Board (CARB), the United States Environmental Protection Agency (EPA), and the Federal Highway Administration (FHWA).

Preferred methods used to assess air quality impacts and human health risks sometimes differ among the agencies listed above. This I-710 Protocol is intended to inform all interested agencies of the planned technical approach to be used in the AQ/HRA. Two main objectives of the Protocol are:

To ensure transparency and allow communication on technical issues amongst various stakeholders

To be a living document until finalized in early 2010, which aims for consensus on the technical approach

The Draft Protocol (released in March 2009) had been reviewed by the I-710 Corridor Project AQ/HRA Working Group as well as the Agency Air Technical Working Group (AATWG) for purposes of soliciting feedback and maximizing consensus on technical issues. This version of the Protocol has incorporated the comments that ENVIRON has received since April 2009 and is intended to be final. However, if official agency guidance changes or significant comments are received during the development of the AQ/HRA, the Protocol may be revised or an Addendum prepared, as appropriate.

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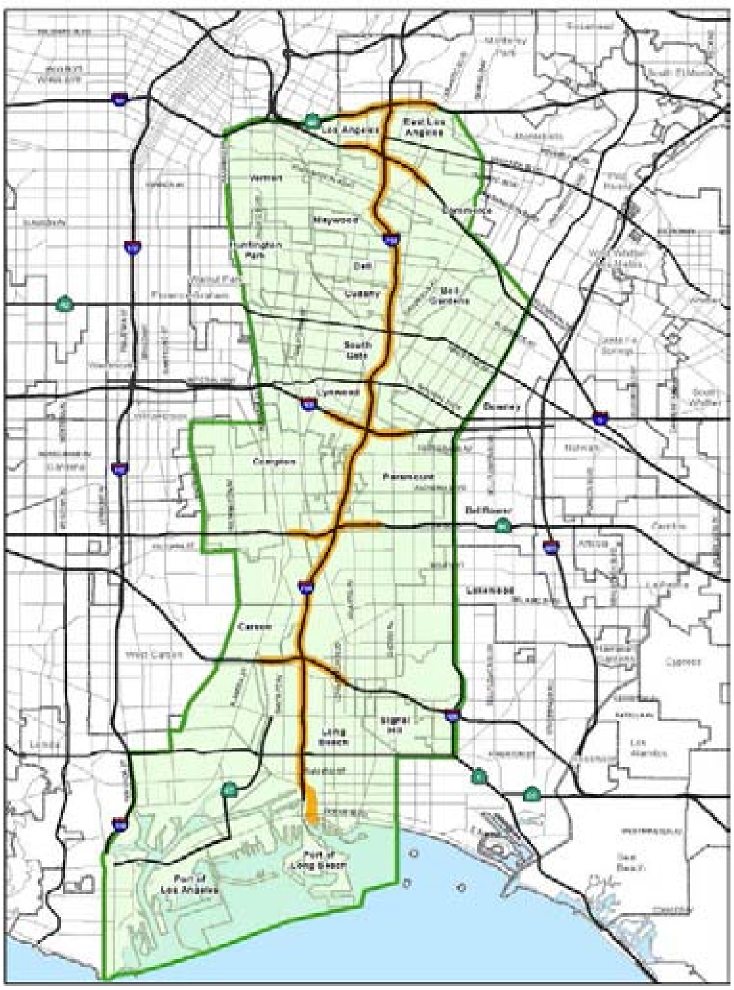
[19] Available at http://www.dot.ca.gov/ser/vol1/sec3/physical/ch11air/chap11.htm

2 Project Description, Alternatives, and Baselines

2.1 Project Description

The I-710 Corridor Project proposes to improve the I-710 in Los Angeles County from Ocean Boulevard in the City of Long Beach to SR-60, a distance of approximately 18 miles, as shown on Figure 1. At the freeway to freeway interchanges, the I-710 Corridor extends one mile east and west of I-710 for the I-405, SR-91, I-105, and I-5 interchanges. The general environmental study area is shaded in green, but each environmental analysis may have its own study area. It is generally not possible or reasonable to do air quality modeling of traffic impacts on every roadway within such a large area because of limitations in modeling resources and because in certain areas the potential incremental impacts will be less than the uncertainty associated with the traffic and/or dispersion modeling.

Figure 1: General Project Environmental Study Area



For the AQ/HRA, emissions will be estimated for the CEQA and NEPA baseline years (2008 and 2035) and all Project Alternatives (Alternatives 5A, 6A, and 6B) using the traffic modeling results based on the I-710 Traffic Model for the entire study area. (The I-710 Traffic Model is described in the February 26, 2010 "*Final Technical Memorandum - I-710 Corridor Project EIR/EIS Travel Demand Modeling Methodology*"; it is based on the regional model that SCAG uses in its transportation planning.) AERMOD dispersion model and a coarse receptor grid will be used to determine the zone of impact for the detailed AQ/HRA modeling. It should be noted that the exact project boundaries, in terms of what roadways are included and excluded in the detailed AQ/HRA modeling, may be different from other environmental analyses being conducted as part of this proposed Project or even for different components of the AQ/HRA, depending on the results of the traffic modeling and limitations of the AQ/HRA models.

2.2 Project Alternatives

URS Corporation (URS), as the primary engineering consultant for this project, in consultation with LSA & Associates, Inc. (LSA, preparing the EIR/EIS), Cambridge Systematics, Inc. (CSI, conducting traffic and goods movement analyses), and ENVIRON, completed the screening process for the project alternatives in May 2009.[20] The consultant team evaluated and selected from the following alternative designs or a combination/variation thereof:

- Transportation Systems Management/Transportation Demand Management (TSM/TDM) and Transit – may include up to eight new ramp meters, improved signage, parking restrictions on major arterials, empty container management through policies and incentives, expanded truck emission reduction program, implementation of truck emission/safety enforcement facilities, expanded public transportation, and an expanded Intelligent Transportation System (ITS) to include entire study area.
- Goods Movement Enhancement by Rail and/or Advanced Technology
- Arterial Highway and I-710 Congestion Relief Improvements
- Mainline I-710 Improvements
  - Option A – Ten general-purpose lanes with no carpool lanes
  - Option B – Eight general-purpose lanes with one carpool lane in each direction (total of 10)
- Locally Preferred Strategy Hybrid Design (I-710 Mainline Improvements with the addition of a separated four lane freight movement facility) - Includes ten general purpose lanes next to a separated four lane freight movement facility from the Ports of Los Angeles and Long Beach (Ocean Boulevard) to the intermodal yards southeast of the I-710/I-5 interchange.

[20] Technical Memorandum – Alternatives Screening Analysis (Final); Prepared for Los Angeles County Metropolitan Transportation Authority; Prepared by URS; May 29, 2009.

This alternative is a community-based recommendation from the previous I-710 Major Corridor Study: Major Opportunity/Strategy Recommendations and Conditions[21.]

In summary, it is recommended that the draft EIR/EIS evaluate the following three Project alternatives:

- Alternative 5A – Ten General Purpose Lanes;
- Alternative 6A – Alternative 5A with the Addition of Four Separate Freight Movement Lanes
- Alternative 6B – Alternative 6A with Zero Emission Trucks/Transports in the Freight Corridor

The AQ/HRA will be performed for the identified Project alternatives starting from the year when the Project is projected to be complete and fully functional, which is currently estimated to be 2035. This Protocol describes the methodology used for the AQ/HRA for the identified Project alternatives and the baseline scenarios that are discussed below. Although not included at this time, additional AQ/HRA analyses for specific interim Project years are under discussion.

2.3 Project Baselines

It should be noted that the AQ/HRA performed for any project under CEQA/NEPA are conducted for the changes in project-related emissions, air quality, and health risks relative to a baseline condition. Therefore, identifying the baseline condition is an important step in the EIR/EIS process. Furthermore, it is important to note that the definition of baseline differs under CEQA and NEPA as discussed below:

- **The CEQA Baseline** represents existing, current conditions, defined to be the conditions at the time the Notice of Preparation (NOP) was released. Therefore, the CEQA baseline will represent project-specific conditions in 2008 (e.g., traffic on the I-710 and selected roadways in 2008).
- **The NEPA Baseline** represents conditions in the 'analysis' year and in the case where no federal funds were used for the Project. In this case, the No Build alternative (also known as Alternative 1) in the year 2035 will represent the NEPA baseline.

[21] I-710 Major Corridor Study Final Report Appendix S - Major Opportunity/Strategy Recommendations and Conditions, Tier 2 Community Advisory Committee, (August 2004), Available at http://www.metro.net/projects_programs/final_report/appendix_s.pdf

3 Air Quality/Health Risk Assessments

The technical assessments to be performed for this AQ/HRA can be categorized as follows:

- Quantifications of Emissions for Criteria Pollutants, Toxic Air Contaminants (TACs, specifically the six priority MSATs), and Greenhouse Gases (GHGs)
- Dispersion Modeling for Criteria Pollutant Impacts and MSATs
- Conformity Assessment for CO and $PM_{10}/PM_{2.5}$
- Human Health Risk Assessment
- PM Mortality
- Ultrafines

Table 3-1a below summarizes the proposed scope of the AQ/HRA, i.e. what activities, sources, and pollutants will be assessed as part of the AQ/HRA, as well as what assessments will be performed for each group of pollutants, consistent with Caltrans's requirements as outlined in Chapter 11 – Air Quality of the Standard Environmental Reference (SER). The proposed scope also includes analyses not traditionally done for freeway projects, but are being added because of the unique goods movement component of the Project and the air quality purpose of the I-710 Corridor Project. ENVIRON will be conducting all of these analyses. Recent goods movement projects at the San Pedro Bay Ports and other places in the South Coast Air Basin (e.g., POLA TraPac and POLB Middle Harbor) have included additional analyses of the same pollutants. Those types of additional analyses are listed in Table 3-1b. ENVIRON may, at the direction of Caltrans, the lead agency, and in consultation with the I-710 AQ/HRA Working Group members, conduct some additional analyses listed in Table 3-1b. It should be further noted that all the assessments mentioned in Tables 3-1a and 3-1b are based on changes as compared to the baselines (both CEQA and NEPA) discussed in Section 2.3.

Table 3-1a. Summary of Proposed I-710 AQ/HRA Analyses

Types of Activities/Sources Included	Types of Emissions Included	Pollutants Assessed	Types of Assessments to be Performed
Project Traffic Operations: Changes in traffic from all types of on-road vehicles on the mainline freeway and other designated Project roadways in the study area	Exhaust Evaporative Tire wear Brake wear Re-entrained paved road dust (Emission types above do not produce all pollutants listed at right)	Criteria Pollutants: Carbon monoxide (CO) Oxides of Nitrogen (NO_x) including Nitrogen Dioxide (NO_2) Volatile Organic Compounds (VOC) Particulate Matter with aerodynamic diameter less than 10 microns (PM_{10}) Particulate Matter less than 2.5 microns ($PM_{2.5}$) Sulfur dioxide (SO_2) and Sulfates (SO_4)	Emissions quantification. Local “hotspot” dispersion modeling of ambient CO concentrations for conformity analysis. Full dispersion modeling for ambient concentrations of criteria pollutants. Qualitative discussion on PM mortality. Qualitative discussion on ultrafine particles.
		Six Priority Mobile Source Air Toxics (MSATs) Diesel exhaust particulate matter and organic gases Benzene 1,3-Butadiene Acetaldehyde Formaldehyde Acrolein	Emissions quantification of the 6 Priority MSATs. Full dispersion modeling for estimating concentrations of the 6 Priority MSATs. Human health risk assessment for the 6 Priority MSATs.
		Greenhouse Gases: Carbon Dioxide (CO_2) Methane (CH_4) Nitrous Oxide (N_2O)	Emissions quantification.
Construction: Activities from both on-road and off-road construction equipment for which activity and schedules are quantified	Exhaust Evaporative Fugitive dust from materials handling/hauling and activity on un-paved areas and roads (Different emissions types above do not all produce all pollutants listed at right)	Criteria Pollutants: Carbon Monoxide (CO) Oxides of Nitrogen (NO_x) including Nitrogen Dioxide (NO_2) Volatile Organic Compounds (VOC) Particulate Matter less than 10 microns (PM_{10}) Particulate Matter less than 2.5 microns ($PM_{2.5}$) Sulfur Dioxide (SO_2) and Sulfates (SO_4)	Emissions quantification.

Table 3-1b. Summary of Potential Additional Analyses That Are Not Currently Proposed for the I-710 Corridor EIR/EIS Study

Types of Activities/Sources	Types of Emissions	Pollutants Assessed	Types of Assessments Possible
Project Traffic Operations: Changes in traffic from all types of on-road vehicles on the mainline freeway and other designated Project roadways in the study area	Exhaust Evaporative Tire wear Brake wear Re-entrained paved road dust (Emission types above do not produce all pollutants listed at right)	Criteria Pollutants: Particulate Matter with aerodynamic diameter less than 10 microns (PM_{10}) Particulate Matter less than 2.5 microns ($PM_{2.5}$)	Quantitative Conformity Analysis for PM_{10}/$PM_{2.5}$, if EPA/FHWA quantitative guidance is issued within the EIR/EIS preparation timeline. Specialized modeling of "near-source" impacts for schools and residences that are directly next to the freeway. Quantification of $PM_{2.5}$ mortality and morbidity impacts (beyond the qualitative mortality assessment currently described in the Protocol). We note that this is an area of evolving regulatory guidance for project-level analyses.
		Air Toxics Additional toxics beyond the 6 Priority MSATs	Health risk assessment for expanded list of air toxics.
Construction: Activities from both on-road and off-road construction equipment for which activity and schedules are quantified	Exhaust Evaporative Fugitive dust from materials handling/hauling and activity on un-paved areas and roads (Different emissions types above do not all produce all pollutants listed at right)	Criteria Pollutants: Carbon monoxide (CO) Oxides of Nitrogen (NO_x) including Nitrogen Dioxide (NO_2) Volatile Organic Compounds (VOC) a.k.a. Total Organic Gases (TOG) Particulate Matter less than 10 microns (PM_{10}) Particulate Matter less than 2.5 microns ($PM_{2.5}$) Sulfur dioxide (SO_2) and Sulfates (SO_4)	Full dispersion modeling to estimate ambient concentrations of the criteria pollutants
		Air Toxics (Specific toxics to be identified)	Emission quantification of identified toxics. Human health risk assessment for the toxics identified
		Greenhouse Gases: Carbon Dioxide (CO_2) Methane (CH_4) Nitrous Oxide (N_2O) Others, if necessary	Emissions quantification

The proposed approach to be used in this Project for the above assessments is summarized in the following sections and the details are described in Appendices. Results of certain assessments are used as inputs to others, and the flow chart in Figure 2 provides a basic overview of how the individual analyses are related to each other. As noted above, the scope of the individual analyses will be based on decisions by the Lead Agency, in consultation with the I-710 AQ/HRA Working Group.

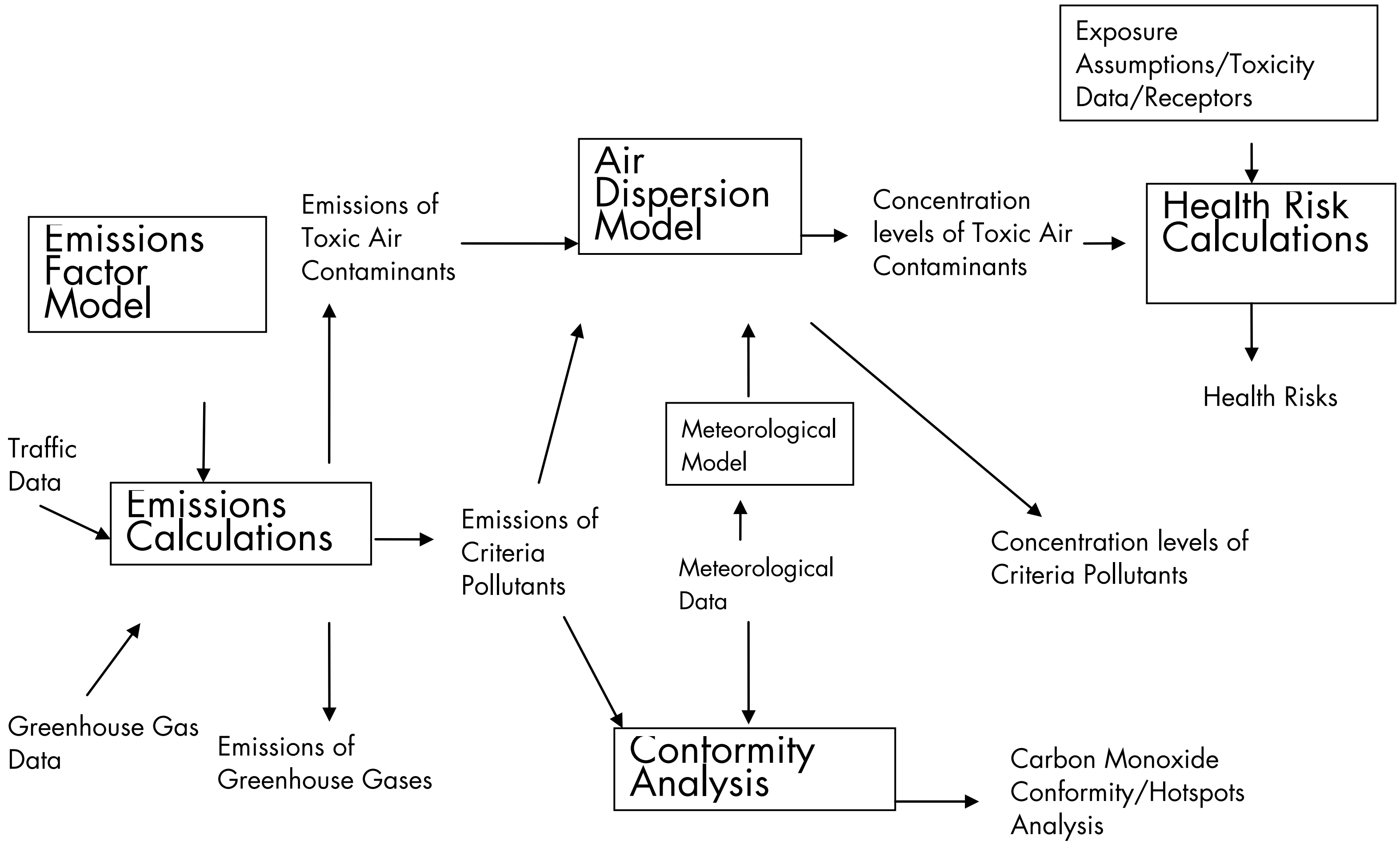


Figure 2: Flow chart showing how technical analyses depend on data and output of other analyses

3.1 Quantification of Emissions

Project emissions form the basis for all other technical assessments in the AQ/HRA. As described in Table 3-1a, emissions from freeway/roadway traffic will be quantified from exhaust, running evaporative losses, tire wear, brake wear, and re-entrained fugitive dust on paved roadways. In order to calculate the incremental emissions, the emissions will be quantified for both CEQA and NEPA baselines and the Alternatives in 2035. The Caltrans SER states that, for areas subject to Transportation Conformity requirements, quantification of emissions from construction activities should be done if the duration of construction activity at a location is greater than five years. The SER also mentions that the CO and $PM_{2.5}$/PM_{10} hot spot impacts of the disturbed traffic flow should be analyzed if construction will last more than three years, or will substantially affect traffic due to detours, closures, and temporary terminations. As such, emissions from construction activity will be quantified for equipment exhaust emissions, running evaporative losses, and fugitive dust from materials handling/hauling and activity on un-paved areas and roads using a screening level approach recommended by the lead agency.

There are two main steps in quantification of emissions from freeway/roadway traffic as presented below:

- Estimating the vehicle activity for various vehicle types in terms of vehicle miles traveled (VMT); and
- Estimating emission factors for the various vehicle types.

Similarly, the quantification of emissions from construction can also be broadly divided in two main steps as presented below:

- Estimating the construction equipment activity in terms of horse power-hour (hp-hr) and quantity of material handled (tons or cubic yards) for various construction activities; and
- Estimating emission factors for the various construction equipment and material handling activities.

Both the vehicle activity and construction equipment activity, including quantity of material handled, is to be estimated by other I-710 Project team members. Therefore, this I-710 Protocol does not discuss the methods/approaches to estimate activity data described above. The approach for development of emission factors is discussed below.

3.2 Approach for Criteria Pollutant Emissions Calculations

3.2.1 Project Traffic Operations

The latest release of the California Air Resources Board's Emission Factors (EMFAC)[22] emissions model, EMFAC2007 version 2.3, will be used to generate the emission factors for various on-road vehicles/mobile sources. Use of EMFAC is generally consistent with Caltrans'

[22] Model and its documentation can be found at http://www.arb.ca.gov/msei/onroad/latest_version.htm.

SER and EMFAC is the preferred model for estimating emissions from on-road vehicles/mobile sources in California as it accounts for California-specific regulations for mobile sources.

Future year emissions factors generated by EMFAC account for the introduction of emissions control technologies that are required by adopted regulations. However, since the last release of EMFAC, the following new regulations/other programs have been adopted/approved that will impact future emissions of heavy-duty trucks that travel on the I-710.

1. The CARB "Regulation to Control Emissions from In-Use On-Road Diesel-Fueled Heavy-Duty Drayage Trucks" (http://www.arb.ca.gov/msprog/onroad/porttruck/porttruck.htm)[23]
2. The Clean Trucks Program that is part of the approved POLA/POLB Clean Air Action Plan (CAAP) (http://www.cleanairactionplan.org/strategies/cleantrucks/default.asp)
3. Measures in the State Implementation Plan (SIP).

The present version of EMFAC model does not account for emission reductions for heavy-duty trucks for the above regulations/ programs. Therefore, the emission factors for heavy-duty trucks from EMFAC model will be accordingly adjusted to quantify the reductions for the above regulations/programs. It should be noted that emission reductions from any future regulations/ programs that are adopted during the preparation of the EIR will be appropriately accounted for in the analysis.

The EMFAC model does not estimate emissions from re-entrained road dust that occurs due to movement of vehicular traffic on the freeway. The emissions for dust entrainment will be calculated using EPA AP-42[24] guidance document. It should be noted that the AP-42 section for dust entrainment emission calculations is currently under review and the latest available version or another appropriate methodology will be used for emission calculations.

3.3 Project Construction

Emissions of criteria pollutants from construction equipment will be estimated using the emission factors derived from the CARB's OFFROAD 2007 emissions model[25]. Similar to EMFAC, OFFROAD currently does not account for some regulations that have been adopted since the last release of the model. OFFROAD factors will be adjusted by ENVIRON to account for the impact of the CARB's regulation for offroad in-use diesel vehicles[26].

Emissions from various material handling activities in construction will be calculated using the methods and equations available in SCAQMD CEQA Air Quality Analysis Handbook[27.]

[23] Adopted on October 12, 2008. http://www.arb.ca.gov/regact/2007/drayage07/drayage07.htm.
[24] AP-42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources. Section 13.2.1. Available at http://www.epa.gov/ttn/chief/ap42/ch13/index.html.
[25] Model along with documentation available at http://www.arb.ca.gov/msei/offroad/offroad.htm
[26] Available at http://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm
[27] SCAQMD CEQA Air Quality Analysis Guidance Handbook, 1993

3.3.1 Approach for Toxic Air Contaminant Emissions Calculations

Toxic air contaminants (TACs) emissions are components of total organic gas (TOG) emissions (gas-phase TACs) and $PM_{10}/PM_{2.5}$ emissions (particle-phase TACs), which are both quantified using EMFAC as described above. Emissions of individual TACs are calculated by applying speciation profiles from the California Air Resources' Board's (CARB) speciation database[28] to total TOG and $PM_{10}/PM_{2.5}$ emissions. There are numerous TACs in mobile source emissions as per the ARB speciation database. However, in discussion with the lead agency, Caltrans, the following six compounds of the 21 Mobile Source Air Toxics (MSATs) were identified by the USEPA[29] as the "priority" MSATs:

- Diesel exhaust (particulate matter and organic gases)
- Benzene
- 1,3-Butadiene
- Acetaldehyde
- Formaldehyde
- Acrolein

Therefore, the emissions for the above compounds will be quantified for this study.

It should be noted that recent health risk assessments in EIR/EIS related to goods movement projects (POLA TraPac and POLB Middle Harbor EIR/EIS) have calculated health risk impacts for more than the 6 TACs listed above. This is commonly referred as a "full HRA" as efforts are made to identify a more comprehensive list of TACs emitted from the project and collective health impacts from these TACs are assessed. If required by Caltrans, and with the concurrence of the I-710 AQ/HRA funding partners, a full HRA will be performed for this project. In a full HRA, emissions of all TACs that are found in the aforementioned speciation profiles would be quantified, and the I-710 HRA would include all project roadways that experience changes in traffic due to the project.

It should be noted that diesel exhaust, which includes both PM and TOG, is not speciated by CARB/OEHHA for calculating chronic and cancer health effects. Instead, toxicity values applicable to the entire mixture of diesel exhaust are used to calculate those impacts. Consistent with the standard approach for these emissions, exhaust PM_{10} emissions from diesel mobile sources will be used as a surrogate for diesel exhaust to estimate cancer and chronic health effects; this TAC is therefore commonly referred to as diesel particulate matter (DPM). The acute health effects of diesel exhaust will be evaluated using the speciated emissions.

More information on emissions assessments is provided in Appendix A.

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[28] Available at http://www.arb.ca.gov/ei/speciate/speciate.htm
[29] Available at http://www.epa.gov/otaq/regs/toxics/toxicfrm.pdf

3.3.2 Approach for Greenhouse Gas (GHG) Emissions Calculations

A combination of the methodologies provided in the California Climate Action Registry's General Reporting Protocol (CCAR GRP) and fuel consumption/efficiency data obtained from EMFAC 2007 and OFFROAD 2007 models, as presented in the Table below, will be used to calculate the GHG emissions associated with the Project. Please note that the quantification of GHG emissions is still an "evolving" field and the proposed methodology may change as new emission factors/guidance documents become available from the regulatory agencies during the duration of preparation of the EIR. It should be further mentioned that the GHG emissions will be quantified for both the baselines and the Project Alternatives in 2035 in order to estimate the incremental GHG emissions. Quantification of GHG emissions for construction will be done only if required by the lead agency.

Table 3-2. GHG Emission Estimation Methodology

Emission Source	Project Phase	Emission Estimation Methodology
Off-road construction equipment	Construction Phase Only	Emission factors from the CCAR GRP will be used for CO_2, CH_4 and N_2O. The emission factors from the GRP are in units of kilograms of GHG per gallon of fuel (kg/gal). These emission factors will be converted to units of g/hp-hr by using default values of brake-specific fuel consumption (BSFC) by equipment horsepower category from OFFROAD2007 and a fuel density value from the GRP. More details on the emission factor conversion from kg/gal to g/hp-hr are provided in Appendix B
Construction worker commute vehicles	Construction Phase Only	CO_2 emission factors from CCAR GRP in units of kilograms of GHG per gallon of fuel (kg/gal) will be used to calculate CO_2 emissions. This emission factor will be converted to units of grams per mile (g/mi) by using the fuel efficiency data from the EMFAC 2007 model. Emission factors for CH_4 and N_2O from the CCAR GRP in units of grams per mile (g/mi) will be used to calculate the emissions of CH_4 and N_2O.
Passenger Vehicles	Traffic Operation Phase Only	
On-road trucks	Both Construction and Traffic Operation Phases	

The total GHG emissions from the project will be reported in carbon dioxide equivalents (CO_2e). CO_2e is universal unit of measurement to indicate the global warming potential (GWP) of each of the six greenhouse gases, expressed in terms of the GWP of one unit of carbon dioxide. It is used to evaluate the impact of different greenhouse gases on a common basis. Emissions of each GHG will be converted to CO_2e by multiplying the CH_4 and N_2O emissions with the respective GWP. Current GWP[30] values used in CEQA analyses are listed below:

[30] Second Assessment Report (SAR) of the Intergovernmental Panel on Climate Change, 1995

Table 3-3. GHG Global Warming Potential

GHG	Global Warming Potential (GWP)
Carbon dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous oxide (N_2O)	310

At this time, it is not expected that other Kyoto GHGs will be emitted in quantities that would materially affect the results of the GHG calculations, despite their higher GWP. More information on greenhouse gas emissions calculations is provided in Appendix B.

3.4 Dispersion Modeling for Criteria Pollutant Impacts & Toxics Air Contaminant Concentrations

Emissions released from sources of air pollution are mixed and diluted in ambient air and ultimately transported away from the source(s). The purpose of the dispersion modeling step is to simulate the release and transport of emissions from project sources in order to estimate the concentrations of individual pollutants, criteria pollutants and TACs, at locations (called 'receptors') within the study area.

For this study, the U.S. EPA's AERMOD dispersion model (http://www.epa.gov/scram001/dispersion_prefrec.htm) will be used to model pollutant concentrations in the study area. Note that this is not the same model that will be used to assess localized CO 'hotspots' as discussed in the next section. EPA has indicated that the current version of the AERMOD is adequate for simulating the roadways (i.e. volume sources). Hence, currently there are no plans to use other line source models (such as CALINE4) to simulate the roadway emissions for near-roadway impacts. It should further be noted that the air dispersion modeling will be performed for both the baselines (CEQA and NEPA) and the project analysis year in order to estimate the increase in concentration of the individual pollutants at various receptors.

Three major elements of a dispersion model exercise are source representation and parameterization, receptor designation, and meteorological data processing. These elements are discussed below:

3.5 Source Representation and Parameters

Emissions from freeway traffic will be modeled in AERMOD as a series of volume sources, which is an accepted practice for modeling mobile sources in a dispersion model (ENVIRON, 2006b,c,d,e,f,g, 2007a,b, 2008). Volume sources will be placed along the roadways of interest using GIS tools. The parameters characterizing the volume sources such as source spacing, initial dimensions and release height will be determined after reviewing, and to be consistent with, recent similar modeling exercises for goods movement sources in Southern California (POLA TraPac and POLB Middle Harbor).

If construction impacts are required to be evaluated in the EIR, construction source exhaust and evaporative emissions will be modeled using volume sources; however fugitive dust sources from construction activities will be modeled as area sources according to the methods used by the SCAQMD in their modeling to determine localized significance thresholds (LST's)[31]. Construction sources will be placed in the model using construction schedules by location as provided by other I-710 team members.

Receptor Designation

Grid receptors will be placed in the model at equally spaced intervals covering the area over which Project impacts could be of significance. The exact extent of the receptor grid will not be known until preliminary modeling begins. Spacing of grid receptors will be chosen to be consistent with applicable guidance documents and via consultation with the lead agency. A fine receptor grid will be placed near source.

Discrete receptors will also be placed at exact locations of known 'sensitive' receptors such as schools, day care centers, hospitals etc. within the Project's zone of impact. In addition, residential receptors located near the I-710 will also be included as discrete receptors.

Meteorological Input Data

Hourly-resolution meteorological surface data, such as wind speed and direction, and upper air data must be provided as inputs to AERMOD for pollutant transport calculations. This information is acquired from existing meteorological stations near to the project that continuously monitor this information. A unique aspect of the I-710 Project is that the freeway is 18 miles in length, and the meteorology over that 18 mile stretch may be different along different stretches of the freeway. For this study a "Sphere of Influence" approach will be used whereby data inputs from different meteorological stations in the I-710 corridor will be used to model pollutant transport at different segments of the freeway, according to proximity and/or applicability of each station to the freeway. Meteorological information will be processed into AERMOD-ready format using the U.S. EPA's AERMET program. The overall preparation of meteorological inputs will consist of:

1. Identification of applicable meteorological stations for each section of the freeway.
2. Acquisition and processing of necessary raw meteorological data from all stations. The preferred length of the dataset for dispersion modeling is five years, however a shorter period is allowed if the information can be shown to be representative of long-term average conditions. For this study, the time period may be limited by the availability of concurrent data for all stations under consideration.
3. Processing of the AERMOD met input files using AERMET and a GIS based internal tool developed by ENVIRON that calculates surface parameters as per the land use. The

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[31] Available at http://www.aqmd.gov/CEQA/handbook/LST/Method_final.pdf

latest guidelines from USEPA issued in January 2008 will be used to perform the surface parameters analysis[32].

More information on dispersion modeling and preparation of meteorological inputs can be found in Appendix C.

Conformity Assessment for CO and PM_{10}/$PM_{2.5}$

A separate analysis from the dispersion modeling for CEQA/NEPA described earlier is a transportation conformity analysis that is required for federally funded transportation projects or projects that require federal approval. Conformity determinations consider whether a project will make air quality in close proximity to the project worse compared to conditions without the project, and whether the project conforms to regional plans to attain federal National Ambient Air Quality Standards (NAAQS).

CO Hotspot Assessment

In general, the procedures as outlined in the "Transportation Project-Level Carbon Monoxide Protocol" (commonly referred to as the "CO Protocol," University of California at Davis, Revised December 1997, UCD-ITS-RR-97-21) will be followed for the CO air quality hotspot assessment. The CO Protocol may also be supplemented through local consultation process to incorporate region-specific processes. Any deviations from use of CO protocol will be clearly justified in the AQ/HRA report. The CO protocol specifies the use of the CALINE4 dispersion model (http://www.dot.ca.gov/hq/env/air/pages/cl_license.htm) to model near source CO concentrations. However, Appendix B, Section B.4 of the CO Protocol provides a comment that "The recommendation to use CALINE4 does not preclude the use of other models approved by EPA such as CAL3QHC…" This section further mentions that the "intersection link" option of CALINE4 should not be used as it calculates modal emissions using algorithm that is based on outdated vehicle fleet information. CAL3QHC has the ability to characterize and model signalized intersections and also has the ability to evaluate the contribution from idling vehicles during red signal times. Therefore it is proposed that CAL3QHC will be used for the CO conformity analysis. Emissions will be quantified as discussed in earlier sections.

PM_{10} and $PM_{2.5}$ Hotspot Assessment

On March 10, 2006, EPA issued amendments to the Transportation Conformity Rule to address localized impacts of particulate matter: "$PM_{2.5}$ and PM_{10} Hot-Spot Analyses in Project-level Transportation Conformity Determinations for the New $PM_{2.5}$ and Existing PM_{10} National Ambient Air Quality Standards" (71 FR 12468). These rule amendments require the assessment of localized air quality impacts of Federally-funded or approved transportation projects in $PM_{2.5}$ and PM_{10} nonattainment and maintenance areas deemed to be projects of *air quality concern*[33]. The critical factor for establishing $PM_{2.5}$ and PM_{10} hotspot criteria is whether

[32] USEPA. AERMOD Implementation Guide. January 9, 2008. http://www.epa.gov/scram001/7thconf/aermod/aermod_implmtn_guide_09jan2008.pdf

[33] Criteria for identifying projects of air quality concern is described in 40 CFR 93.123(b)(1).

or not a project's direct $PM_{2.5}$ and PM_{10} emissions could actually cause a new violation, worsen an existing air quality violation, or delay timely attainment of the PM_{10} or $PM_{2.5}$ National Ambient Air Quality Standards.

The qualitative PM_{10} and $PM_{2.5}$ analysis would follow EPA's Guidance "Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas" (EPA420-B-06-902). The interagency consultation process would be used to reach concurrence with the methods and underlying assumptions to be used in the $PM_{2.5}$ and PM_{10} hotspot analyses (40 CFR 93.105). The USEPA has been working on the guidance on performing quantitative hot-spot analyses for $PM_{2.5}$ and PM_{10} for project-level conformity determinations. The quantitative analyses for $PM_{2.5}$ and PM_{10} conformity will be performed if the guidance is issued in the EIR/EIS preparation timeframe.

More information on conformity/hotspots assessments can be found in Appendix D.

3.6 Health Risk Assessment

As noted earlier, standard Caltrans' procedures for CEQA/NEPA analyses for transportation projects includes the impact of the emissions of the 6 priority MSATs only, also known as an MSAT analysis. (The six MSATS are: Diesel exhaust, Benzene, 1,3-Butadiene, Acetaldehyde, Formaldehyde, and Acrolein). CEQA/NEPA assessments for goods movement projects in the South Coast Air Basin, however, have recently included a "full HRA" whereby the emissions of multiple air toxics, including the six MSATs, are quantified, their ambient concentrations assessed, and their collective health risks estimated by combining exposure assumptions for the population with published toxicity data for individual TACs.

Given that the I-710 Project is associated with goods movement, in particular related to activities of the Ports of Los Angeles and Long Beach, Caltrans, as the lead agency, may choose to conduct a full HRA.

The I-710 HRA will be conducted using a methodology that is consistent with Office of Environmental Health Hazard Assessment (OEHHA)[34] Air Toxics Hot Spots Program Risk Assessment Guidelines and SCAQMD Rule 1401/212 risk assessment guidance[35]. The HRA will be performed for both the baselines (CEQA and NEPA) and the Project Alternatives in 2035 in order to estimate the incremental health risks at the various receptors.

Health risk assessments can be outlined as a four-step process that includes:

- Hazard identification
- Exposure assessment

[34] Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003.
[35] South Coast Air Quality Management District, Risk Assessment Procedures for Rules 1401 and 212. Version 7.0. July 2005

- Dose-response assessment
- Risk characterization.

The first step of the HRA process is to identify the contaminants of potential concern (COPC) and sources of these chemicals, as well as to estimate the levels of emissions from each source. This process is called "hazard identification." COPCs can be defined as contaminants that are known to be carcinogens or are linked to having adverse acute or/and chronic health impacts. The COPC will be identified as the TACs included in the speciation profiles applied to the Project's construction and traffic operational sources. Caltrans guidance (i.e., the SER, based on FHWA guidance) has already identified 6 of these COPC, which are the 6 priority MSATs described earlier in the Protocol. Additional COPCs, other than the 6 priority MSATs, will be identified if a full HRA is required to be undertaken.

The second step, known as "exposure assessment," is concerned with the quantity of a contaminant that people are exposed to during a specific time period, as well as the populations of interest (e.g., residential, commercial, sensitive population, etc.). Once the identity and location of the source(s) are known, the amounts and the process of transporting the contaminants through the environment need to be identified. Computer models, such as AERMOD, use mathematical equations to simulate the movement and dispersion of air contaminants. The models incorporate factors, such as the distance from the source to the exposed population, wind speed and direction, and contaminant release height. Once the amount of exposure to each toxic air contaminant is identified, an assessment of the contaminant path into the human body is performed. For air emissions, breathing (inhalation) is usually the primary route by which a contaminant enters the body, but contaminants can also enter through eating (ingestion) of soil or produce, through mother's milk or can be absorbed through the skin (dermal absorption). The route through which a contaminant enters the body is called a "pathway." The risk assessment models normally used to assess the health risks (such as HARP) are multi-pathway model and account for all applicable exposure pathways for a particular contaminant. An alternative to using the multi-pathway risk models is to use multi-pathway factors for each contaminant, which has been recommended by the SCAQMD. ENVIRON is proposing to use the multi-pathway factors as discussed subsequently in this protocol.

The third step of an HRA is called "dose-response assessment." Dose is the amount of a chemical that enters the human body (or reaches a targeted organ); response is the resulting health effect from the level of the dose. Epidemiologists, toxicologists, and other researchers conduct animal and human epidemiological studies to evaluate and establish the causal relationships between the various doses and the resulting health effects (responses) for a chemical. These causal relationships are quantified as the cancer potency factors (CPF) or unit risk factors (URF) for carcinogenic health effects and acute and chronic Reference Exposure Levels (RELs) for non-carcinogenic health effects. The values of CPS and RELs from the latest version of the Consolidated Table of OEHHA / ARB Approved Risk Assessment Health Values for the various COPC will be used in the HRA.

The last step of the risk assessment process is called "risk characterization." Risk characterization integrates the above three processes to describe the type and magnitude of any increased health risks that may occur as a result of exposure to the toxic air emissions from a facility or project. For the purpose of this HRA, acute, chronic, and cancer health impacts will be defined as follows:

Acute risks are non-cancer adverse health impacts, commonly associated with exposures to relatively high concentrations of toxic air contaminants over short periods of time, from minutes to hours. Acute exposure typically results in headaches, dizziness, nausea, eye/nose/throat irritation, and/or skin rash. Each toxic chemical has a unique acute toxicological profile and specific target organs.

Chronic risks are non-cancer adverse health impacts, commonly associated with exposures to relatively low concentrations of toxic air contaminants over long periods of time, as in several years. Typical symptoms of chronic exposure include persistent respiratory or digestive problems, chronic cough, chest pains, numbness or tingling, loss of smell or taste, etc. Each toxic chemical may affect the body through different mechanisms and target organs causing different chronic health effects.

Cancer is defined as the abnormal or irregular growth of cells or tissue. There are many triggers that may cause or increase the risk of cancer, including exposure to certain chemicals or toxic air contaminants. The increased risk of cancer from exposure to a chemical means the additional risk of getting cancer from continuous exposure (70 years and 365 days per year) to potentially cancer-causing compounds. Cancer risk is usually expressed as a probability (e.g., ten in one million exposed populations).

Unlike cancer health effects, non-cancer acute (short term) and chronic (long term) health effects are generally assumed to have thresholds for adverse effects. These thresholds, represented as a concentration level (ug/m^3) or dose (mg/kg-day) at which no adverse health effects are anticipated, are also called Reference Exposure Levels (RELs). RELs are used to calculate the hazard indices (HI) which gives an indication of the likelihood of experiencing chronic or acute health effects.

As stated earlier in the protocol, the HRA for the project will be performed using a combination of OEHHA and SCAQMD methodologies. The HRA will be a multi-pathway risk assessment, which means that all the applicable pathways for a particular contaminant will be evaluated while calculating the health risks. To perform the health risk assessment for this project, the first option is to use the Hotspots Analysis and Reporting Program (HARP), which has been developed by the California Air Resources Board (CARB). HARP is often used as a tool to evaluate health risk impacts and is a computer software package that which incorporates the requirements of the OEHHA Air Toxics Hot Spots Risk Assessment guidelines. HARP combines facility prioritization, air dispersion modeling, and health risk analysis into a single software package. The HARP model currently uses ISC3 as the dispersion model; however, CARB has released a software package called “HARP On-Ramp” that allows a user to import the output from AERMOD model runs directly into the risk module of HARP. The second option is to use the procedure outlined in, which does not require the use of HARP. Due to the high degree of complexity required for the modeling representation of the emission sources, it is proposed that HARP will not be used for this Project and that the health risks will be assessed using the SCAQMD Rule 1401/212 Risk Assessment Guidance, which is discussed in detail in Appendix E.

3.7 PM Mortality

The Caltrans SER does not require that PM Mortality analyses be performed for freeway projects. However, the recent EIR/EIS for goods movement projects (POLA TraPac and POLB Middle Harbor) have conducted PM mortality analyses. The AQ/HRA Report will contain a qualitative discussion on potential mortality associated with exposure to PM emissions from the proposed Project.

3.8 Ultrafine Particles

Recent toxicological studies have shown that ultrafine particles (defined as particles with diameters less than 0.1 μm) possess the ability to inflict adverse health effects. In the urban environment, motor vehicles are a major source of ultrafine particles (UFP), and for that reason UFP are found in high numbers near highways. Currently, no federal or state standards for UFP have been developed. There are no guidelines for quantitative analysis of UFP emissions. However, the AQ/HRA Report will present a qualitative discussion on UFP emissions and their associated health effects.

4 Cumulative Impacts Analyses

CEQA and NEPA require that cumulative impacts of a project be discussed when the project's incremental effect may be cumulatively considerable. As per CEQA, a Project is considered as "cumulatively considerable" if the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. Section 15130 of CEQA provides that the EIR may contain either of the following two methods of identifying a project's cumulative impacts:

1. The EIR may provide a list of past, present, and probable future projects producing related or cumulative impacts, or
2. The EIR may provide a summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document that has been adopted or certified, which described or evaluated regional or area-wide conditions contributing to the cumulative impact.

A "probable future project" is further defined in the CEQA as follows:

- A project for which an application has been received by the time the Notice of Preparation for the Project is released;
- A project that is included in an adopted capital improvements program, general plan, regional transportation plan, or other similar plan;
- A project included in a summary of projections of projects (or development areas designated) in a general plan or a similar plan;
- A project anticipated as a later phase of a previously approved project (e.g., a subdivision); or
- Public agency projects for which money has been budgeted.

For this project, Approach 1 will be used, which describes listing of the past, present, and probable future projects to comply with CEQA requirements of reporting cumulative impacts from the project. Maximum impacts from related projects will not be added together since those maximum impacts do not necessarily occur at the same location; rather, the magnitude of maximum impacts from related projects will be qualitatively discussed. It should be noted that CEQA guidelines specifically state that the cumulative analysis will be less detailed than the analyses performed for the project (in other words, qualitative vs. quantitative). At the discretion of the lead agency, cumulative impacts from the I-710 Corridor Project and the I-5 freeway project currently going through the EIR/EIS development process may be assessed quantitatively together. That quantitative evaluation is not discussed here but may be added as an Appendix in future versions of this I-710 Protocol.

5 Significance and Conformity Determinations

One important element of the CEQA/NEPA process is to discuss the significance of the project impacts. Lead agencies may choose to use certain numerical or performance-based thresholds for emissions, ambient concentrations, and/or health impacts against which to judge if a project's impacts are significant and potentially require mitigation. It should be noted that Caltrans' current policy is not to use numerical significance thresholds for transportation projects' air quality and health risk impacts, except for project level conformity analyses for CO, PM_{10} and $PM_{2.5}$, where the project needs to demonstrate conformity with the federal Clean Air Act. Caltrans is in the process of developing a guidance document to evaluate greenhouse gases emissions and related thresholds, which may be available during the preparation of the I-710 EIR/EIS. Outside of the conformity determination, the AQ/HRA Report will not assess the significance of specific air quality and health risk impacts for the proposed I-710 Project or project alternatives, but will provide the results necessary for those determinations to be made in the EIR/EIS.

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