



# Near-road Monitoring – Federal Purpose, Requirements, and Considerations

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# Overview

- What pollutants?  $\text{NO}_2$ , CO,  $\text{PM}_{2.5}$
- What can monitoring be used for?
- Relationship between EPA standards, monitoring, & public health.
- Near roadway monitoring requirements: where, when.
- What to consider when siting a near roadway monitor.
- Process/documentation



# What does monitoring tell you?

- Shows a concentration at a specific location, at a specific point in time - - what someone standing in that spot, at that time, would have been exposed to.

# What can this information be used for?

- Public information
- Research
- **Comparison to a standard (e.g., National Ambient Air Quality Standards – NAAQS)**



## Relationship between Standards, Monitoring, and Protecting Public Health

- Standards. EPA sets the NAAQS at a level appropriate to protect public health, taking into account sensitive and vulnerable groups.
- Monitoring. Whether or not an area is meeting these standards is typically determined by monitoring:
  - Can't have monitors everywhere, so look to place monitors in locations with high concentrations.
- If a monitor violates, state (local) agencies/EPA identify the “nonattainment” area, through a public process.
- Protecting Public Health. The state (local) agency is then required to develop a plan (State Implementation Plan – SIP) to bring the area into attainment.



## South Coast Near-Roadway Monitoring Requirements – Timing\*

	Los Angeles-Long Beach- Santa Ana	Riverside-San Bernardino-Ontario
By January 1, 2014 (July 1, 2013 network plan)	1 NO <sub>2</sub> monitor	1 NO <sub>2</sub> monitor
By January 1, 2015 (July 1, 2014 network plan)	2 <sup>nd</sup> NO <sub>2</sub> monitor	2 <sup>nd</sup> NO <sub>2</sub> monitor
	1 CO monitor	1 CO monitor
	1 PM <sub>2.5</sub> monitor	1 PM <sub>2.5</sub> monitor
By January 1, 2017 (July 1, 2016 network plan)	-	-

Note: CO and PM<sub>2.5</sub> monitors are expected to be placed at NO<sub>2</sub> near roadway monitoring stations. NO<sub>2</sub> near roadway guidance document outlines how these stations should be selected.

\*Timing listed is based on: proposed NO<sub>2</sub> monitoring requirements revision; and finalized CO and PM NAAQS rulemaking.



# Considerations When Siting a Near Roadway Monitor

- - *Per EPA Siting Criteria (40 CFR 58, Appendix E), and EPA's June 2012 "Near-road NO<sub>2</sub> Monitoring Technical Assistance Document" - -*



## Where does the near-road site go?

Q: Where should the NO<sub>2</sub> monitor be placed?

A: Where maximum hourly NO<sub>2</sub> concentrations are expected to occur.

Q: How do you determine where the maximum hourly NO<sub>2</sub> concentrations are expected to occur?

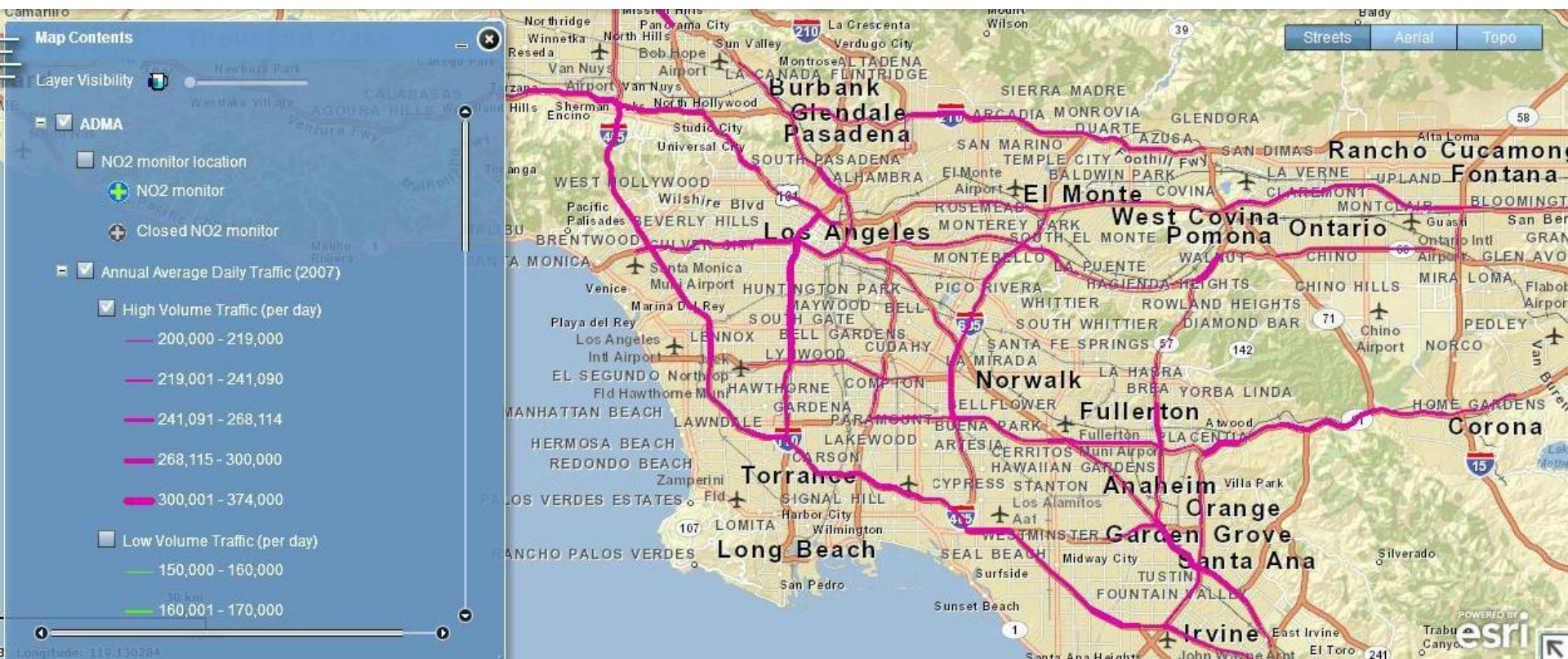
A: Consider emissions, and how those emissions will be transported to the monitor:

- Emissions: Annual Average Daily Traffic; Fleet mix; Congestion patterns
- Siting: Meteorology; Terrain; Roadway Design
- Also, consider population exposure when agencies identify multiple acceptable candidate sites according to above factors

Q: Is there any difference in the site selection process for CBSAs with two required sites?

A: Have different characteristics (ie different fleet mix; congestion patterns; terrain; geographic area within the CBSA; or different route, interstate, or freeway designation).

# Roadway Emissions – Annual Average Daily Traffic (AADT)





# Roadway Emissions – Fleet Equivalent Annual Average Daily Traffic (FE-AADT)





# Roadway Emissions – Congestion Patterns

Level of Service (LOS) Rating	General Definition
LOS "A"	<b>No delays.</b> Very high maintenance service level. Roadway in excellent condition.
LOS "B"	<b>Occasional delays.</b> High service level. Roadway in good condition.
LOS "C"	<b>Short term delays when repairs are being made.</b> Medium service level. Roadway in fair condition. Systems occasionally inoperable.
LOS "D"	<b>Occasionally, significant delays.</b> Low service level. Roadway in poor condition. Systems failures occur.
LOS "F"	<b>Significant delays occur on a regular basis.</b> Very low service level. Roadway in poor and failing condition. A backlog of systems failures.

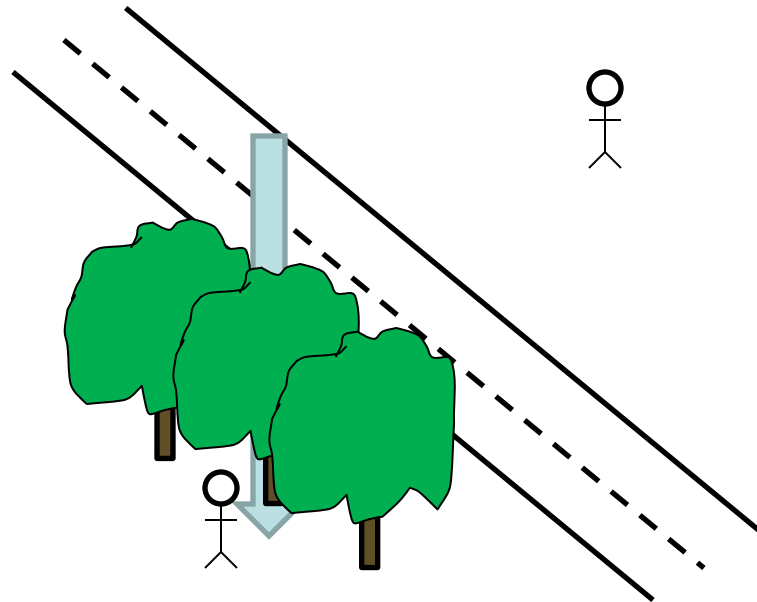
# Siting Considerations

## Meteorology

- + be downwind
- Strongly predominant upwind positions

## Roadside Structures

- + no barriers affecting wind flow
- Presence of sound walls, mature (high and thick) vegetation, obstructive buildings



# Siting Considerations

## Terrain

- + Flat or gentle terrain, within a valley, or along road grade
- Along mountain ridges or peaks, hillsides, or other naturally windswept areas





# Siting Considerations

## Roadway Design & Configuration

- + be at grade
- significantly below grade (deep cut-sections);
- above grade (fill or bridge)





# Additional Near-road Siting Notes

(per 40 CFR Part 58, Appendix E)

Horizontal spacing	<p>Per 40 CFR Part 58 Appendix E: <u>“As near as practicable</u> to the outside nearest edge of the traffic lanes of the target road segment; but <u>shall not be located at a distance greater than 50 meters</u>, in the horizontal, from the outside nearest edge of the traffic lanes of the target road segment.”</p> <p><b>***The EPA recommends the target distance for near-road NO<sub>2</sub> monitor probes be within 20 meters of the target road whenever possible.</b></p>
Vertical spacing	<p>Microscale near-road NO<sub>2</sub> monitoring sites are required to have sampler inlets between 2 and 7 meters above ground level.</p> <p><b>***The EPA recommends the target height be as close to 2 meters (i.e. ground-level) as possible.</b></p>
Spacing from supporting structures	<p>The probe must be at least 1 meter vertically or horizontally away from any supporting structure, walls, parapets, penthouses, etc., and away from dusty or dirty areas.</p>
Spacing from obstructions	<p>For near-road NO<sub>2</sub> monitoring stations, the monitor probe shall have an unobstructed air flow, where no obstacles exist at or above the height of the monitor probe, between the monitor probe and the outside nearest edge of the traffic lanes of the target road segment.</p>



# Common Challenges to Securing a Near-Road Site

- Owners unwilling (lease agreements, monitor creates negative impacts to future property development)
- No access
- No power
- Sound walls
- Elevated roadways
- Safety issues (many seemingly “perfect” CalTrans property sites can be denied due to lack of required stopping/breaking distances, lack of safety barricades, prohibition against installing new barricades that become safety obstacles)
- Current/future road construction
- Lack of cohesive response from DOT agencies, agreements may not fit well with existing DOT lease agreements

# Documentation

- Need to be able to explain why the site has been chosen
  - To the public and to EPA
- EPA's starting assumption for first required NO<sub>2</sub> site in a CBSA: most desirable site is typically along the road segment with highest FE-AADT.
  - Rank your road segments by FE-AADT
  - Look for sites along your #1 ranked segment
    - Consider everything previously mentioned (congestion patterns, meteorology, terrain, roadway design, power, safety, accessibility, etc)
  - If a suitable site cannot be found along the #1 FE-AADT ranked segment, document why, and move down the list to the #2 FE-AADT ranked segment
- Second site in a CBSA (if required) must be differentiated from the first.





Thank You!