Fehr & Peers

Memo

Date: July 8, 2026

To: Steve Reid, Bay Area Air District, Zhongping Xu, and Kelsey Rodriguez (Caltrans)

From: Molly Sun, Hugh Louch, Fehr & Peers

Subject: On-Road Emissions and Community Health Burden Assessment

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Overview

This memorandum summarizes preliminary results produced by the Bay Area Air District (Air District) from two linked analyses supporting the I-580 Truck Access Study: estimation of on-road diesel particulate matter (DPM) and fine particulate matter ($PM_{2.5}$) emissions within the study area, and a population-weighted assessment of community exposure to DPM and the associated excess cancer risk.[1] Both analyses evaluate three scenarios: 2020 With Ban, representing current conditions under the existing I-580 truck restriction; 2035 With Ban, in which the restriction remains in place; and 2035 No Ban, in which the restriction is removed. Both 2035 scenarios reflect a cleaner vehicle fleet as older diesel trucks are replaced or retrofitted with diesel particulate filters—as mandated by California's regulatory environment.

Two findings frame the results that follow. First, projected fleet turnover drives the sharp reduction in diesel burden over time. Modeled DPM emissions fall by about 73 percent between 2020 and 2035 across the study area, and community DPM exposure and excess cancer risk fall by a similar margin for every group examined. Second, removing the restriction redistributes truck activity between I-880 and I-580 and has little impact on total emissions within the study area. By 2035, the difference between the With Ban and No Ban scenarios is small relative to the effect of fleet changes between 2020 and 2035.

The community burden results indicate that under current conditions, environmentally burdened communities, Equity Priority Communities, older adults, and people with disabilities carry substantially higher DPM exposure and excess cancer risk than the study-area average. These disparities compress to a lower and nearly uniform level by 2035 in both future year scenarios.

Methods

Emissions Estimation

Vehicular emissions, including exhaust, brake wear, and tire wear, were estimated at the roadway-link level by combining travel demand model outputs with emission rates from the California Air Resources Board's EMFAC2021 model. $PM_{2.5}$ was estimated using a U.S. Environmental Protection Agency (EPA) paved-road method based on link-level vehicle miles traveled, silt loading, and average vehicle weight. Emissions were estimated for all applicable roadways in the study area, including freeways and major arterials.

For the 2035 scenarios, vehicular emissions were adjusted to reflect the revocation of the federal waivers that had allowed California to set its own vehicle emissions standards, including electric vehicle

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[1] Source: I-580 TAS Emissions Estimates, Preliminary Results (27 February 2026). Population-weighting methodology follows Holstius and Martien (2021, 2022).

requirements. For the purpose of this analysis, the future fuel efficiency of trucks does not include any California-specific requirements for fuel efficiency or electric vehicle adoption.

Vehicles were grouped into EMFAC2021 classes for purposes of emissions estimation. Heavy trucks, defined as commercial trucks over 9,000 pounds and subject to the I-580 restriction, include the light-heavy-duty (8,501 to 14,000 pounds), medium-heavy-duty (14,001 to 33,000 pounds), and heavy-heavy-duty (over 33,000 pounds) categories, and are reported together as "Truck". All other vehicles, including passenger cars and trucks, medium-duty trucks at or below 8,500 pounds, motorcycles, and motor homes, are reported as "Non-truck."

Dispersion Modeling

To estimate the community burden of potential changes in emissions from trucks and other vehicles, the Air District used EPA's AERMOD model to simulate the dispersion of air pollutants across the study area. Model inputs include roadway segment-level emissions, information about topography, and meteorological data such as wind speed and direction. This model produces ground-level pollutant concentration estimates at 50 meter spacing across the study area, with a focus on $PM_{2.5}$, DPM, and other air toxics. This modeling approach is consistent with similar roadway modeling the Air District has recently performed to support analyses under the California Environmental Quality Act (CEQA) and community-scale air quality assessments under California Assembly Bill 617 (AB 617).

Air pollution concentrations near major roadways have been studied extensively and research shows that pollutant concentrations decrease sharply with distance from the road edge, falling to near background levels within several hundred yards (Karner et al., 2010). Air District modeling results are consistent with this expected pattern.

Community Exposure and Health Burden

Modeled concentrations were combined with residential population to compute population-weighted mean DPM exposure, expressed in micrograms per cubic meter, and excess cancer risk attributable to modeled on-road DPM, expressed as cases per million. This population-weighting approach is consistent with prior Air District equity assessments (Holstius and Martien 2021, 2022).

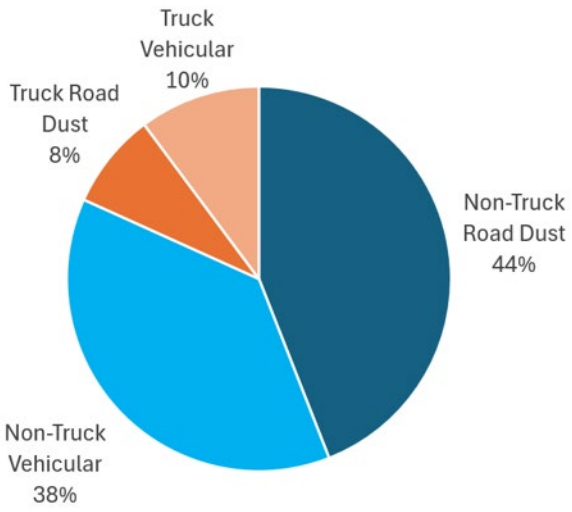
Results were summarized for community groups defined by CalEnviroScreen 4.0 equity designations, Equity Priority Communities, census race and ethnicity, age, and income. The study area group represents the residential population across the full study area and serves as the reference for comparison.

Emissions Results

Corridor Totals and Trends

Freeways and state highways account for about 95 percent of study area DPM and about 75 percent of study area $PM_{2.5}$. As previously noted, DPM emissions are expected to decline over time. Total study area DPM was estimated to fall from 4.06 tons per year today to 1.09 tons per year in 2035 with the ban still in place, a reduction of over 70 percent. This decline is driven primarily by fleet turnover and diesel regulations. Trucks account for roughly 90 percent of DPM emissions in every scenario. $PM_{2.5}$ emissions decline far less between 2020 and 2035, decreasing from around 66 to 61 tons per year (about 8 percent), because non-truck vehicles (which are mostly gasoline-powered) account for more than 80 percent of $PM_{2.5}$ emissions and road dust contributes more than half of the total (**Figure 1**).

Figure 1. Distribution of On-Road PM2.5 Emissions in the I-580 Study Area (2020 Baseline)



Source: Bay Area Air District

Distribution by Roadway and Scenario

Because removal of the ban is expected to shift truck activity from I-880/I-238 to I-580, removing the ban is expected to reduce DPM on I-880 by about 28 percent and increase it on I-580 by nearly 4 times. However, this increase is on a very small base (0.10 tons per year) and 2035 DPM estimates near I-580 remain lower in 2035 without the ban (0.41 tons per year) than they are in the baseline with the ban in place (0.44 tons per year). $PM_{2.5}$ follows the same pattern at smaller magnitude: removing the ban reduces $PM_{2.5}$ on I-880 by 7 to 10 percent and increases it on I-580 by 14 to 19 percent. DPM and $PM_{2.5}$ are expected to remain higher on I-880 than on I-580 in every scenario. Removing the ban also lowers emissions on I-238 (DPM down about 45 percent, $PM_{2.5}$ down about 20 percent), while emissions on I-80, I-980, and arterials change little and state highway emissions rise slightly. **Tables 1 and 2** report emissions for each roadway and scenario.

Table 1. On-road DPM emissions by roadway and scenario (tons per year).

Roadway	Today with Ban	2035 with Ban	2035 No Ban
I-880	2.42	0.65	0.47
I-580	0.44	0.10	0.41
I-238	0.28	0.09	0.05
I-80	0.06	0.02	0.02
I-980	0.02	0.01	0.00
State Hwys	0.64	0.19	0.20
Arterials	0.20	0.04	0.04
Total	4.06	1.09	1.20

Source: Bay Area Air District.

Table 2. On-road PM2.5 emissions by roadway and scenario (tons per year).

Roadway	Today with Ban	2035 with Ban	2035 No Ban
I-880	22.41	19.35	17.93
I-580	15.12	13.72	15.65
I-238	1.64	1.38	1.12
I-80	1.21	1.07	1.08
I-980	0.60	0.55	0.55
State Hwys	10.46	9.56	9.64
Arterials	14.93	15.20	15.17
Total	66.37	60.83	61.15

Source: Bay Area Air District.

Community Health Burden Results

Table 3 reports population-weighted excess cancer risk for each community group and scenario. These cancer risk values are based on modeled concentrations of DPM and other air toxics. Because DPM is the main driver of cancer risk, changes in DPM exposure track very closely to the changes in cancer risk values in Table 3. Equity focus areas are defined as described below:

- **Environmentally Burdened Communities:** Environmentally burdened communities, also referred to as SB 535 disadvantaged communities, are the census tracts and tribal lands that California designates as most burdened by pollution and socioeconomic vulnerability, which qualifies them for a statutory minimum share of Greenhouse Gas Reduction Fund (cap-and-trade) investment. CalEPA identifies them using CalEnviroScreen 4.0, capturing the top 25 percent highest-scoring tracts along with certain high-pollution tracts, previously designated tracts, and federally recognized tribal lands

- **Equity Priority Communities:** The Metropolitan Transportation Commission (MTC) designates Equity Priority Communities (EPCs) based on the share of low income households, people of color, limited English proficiency, limited access to vehicles, and other factors that relate to historic underinvestment. MTC directs regional transportation funding toward projects in these neighborhoods, such as transit improvements and biking and walking infrastructure.

Under current conditions, DPM exposure and excess cancer risk are distributed unevenly across the study area. Environmentally burdened communities experience the highest burden, about twice the study area average. Equity priority communities, adults age 75 and older, Native American, Asian, and low-income residents are also more exposed to Diesel Particulate Matter and excess cancer risk as compared to the study area as a whole.

In the 2035 with Ban scenario, DPM exposure and excess cancer risk are expected to fall by roughly 70 to 75 percent for every group, as compared to current conditions. Cancer risk values for all groups could be between 4 and 9 cancer cases per million people in 2035.[2] However, some disparities remain for environmentally burdened communities, which are projected to face a risk of 9 cancer cases per million, compared to a 2035 study area average of 5 cases per million.

While the decline over time is expected to be significant, the change from the 2035 With Ban to No Ban scenarios is small. For most groups it falls within 1 case per million, at or near the resolution of the reported values. These numbers are very low and likely within the error of the model. Removing the restriction marginally raises DPM exposure in the study area, while the No Ban value for environmentally burdened communities is equal to or marginally below the With Ban value. This pattern reflects the spatial redistribution of truck activity: removing the restriction pulls trucks off I-880 where many environmentally burdened communities are concentrated. The practical implication is that the greatest exposure and equity benefit occurs as a function of turnover of the diesel fleet.

[2] Excess cancer risk is shown as cases per million people. Because there are approximately 700,000 people living in the study area, observed excess cancer cases could be lower than reported here.

Table 3. Excess cancer risk (cases per million people) by community group and scenario.

Community group	Excess cancer risk (per million)		
	Today With Ban	2035 With Ban	2035 No Ban
Equity focus areas			
Environmentally burdened	28	9	8
Equity Priority Communities	17	6	6
Study area (reference)	14	5	5
Race and ethnicity			
White	12	4	5
Black	13	5	6
Native American	15	5	5
Asian	17	6	6
NH / Pacific Islander	16	6	5
Latino	14	5	5
Two or more races	13	5	5
Age			
Under age 10	12	4	5
Age 65 and older	13	5	5
Income			
Below 200% of poverty	15	5	6

Source: Bay Area Air District.

Key Findings and Implications

Modeled DPM emissions are projected to decline by more than 70 percent between today and 2035, and, with the restriction removed, DPM on I-580 in 2035 would remain below today's levels. Changes in DPM emissions are more pronounced than changes in PM2.5, because DPM is most closely related to heavy-truck activity while PM2.5 is generated primarily by non-truck vehicles and road dust.

Removing the ban on trucks shifts truck activity between I-880/I-238 and I-580, shifting some of burden to I-580. However, DPM and PM2.5 remain higher near I-880/I-238 than near I-580 in every scenario.

Community burden results were estimated by comparing the distribution of emissions to the locations of demographic groups. Disparities are sharpest under current conditions, though environmentally burdened communities continue to face somewhat higher cancer risk from traffic pollution than the study area average under all 2035 scenarios. The negative air quality impact of the truck restriction on I-580 has already fallen on the communities along I-880 and I-238; the change in the future will be small as emission from trucks continue to decline with fleet turnover.

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