Appendix A:
Full CLC-RCI and GSEJA Letters

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A.1 - CLC-RCI Letter

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PATIENCE MILROD
LAWYER/LICENCIADA EN LEYES

March 24, 2025

City of Fresno
Planning and Development Department
Sophia Pagoulatos, Planning Manager
2600 Fresno Street, Room 3065
Fresno, CA 93721
Sent by email: longrangeplanning@fresno.gov

RE: Public Comment on 2025 Recirculated draft Program Environmental Impact Report for Southeast Development Area Plan

Dear Ms. Pagoulatos:

On behalf of the Fresno Madera Tulare and Kings Counties Central Labor Council and Regenerate California Innovation (RCI), I respectfully request the City incorporate the following comments, and attachments, regarding the Southeast Development Area Specific Plan and Recirculated draft Program Environmental Impact Report into the record of this matter. We look forward to substantive responses to these comments. 1

NOTE: Due to the fact that the infrastructure plan, budget, and public facilities financing plan have not yet been released for public review or comment, these commenters respectfully request an extension of 45 days from the date they are released for public comment on the SEDA Recirculated draft EIR. See section 7.e, infra.

1. The City's contract with HCD does not require that the City Council adopt the SEDA Plan, nor that it approve the SEDA EIR. 2

The City's application for the grant that funded the SEDA EIR[1] includes Schedule F, which identifies Council adoption as a "deliverable" under the grant. The Grant Agreement itself,[2]

[1] Attached hereto as Exhibit 1.

[2] Attached hereto as Exhibit 2. See specifically, Exhibit D, Section 4 (Remedies of [sic] Non-performance), subsection E. Similarly, Senate Bill 2 Planning Grant Program Year 1 Guidelines (https://www.hcd.ca.gov/grants-funding/active-funding/planning-grants/docs/sb2-planning-grant-

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however, while requiring a "strong implementation component," recognizes that the locality may only formally adopt the completed planning document "where appropriate."

In this case, for the reasons set out in this letter, adoption of the SEDA Plan and approval of the Recirculated Program Environmental Impact Report would not be an appropriate exercise of the City Council's legislative discretion, nor can the SB2 grant award contract compel the City Council to exercise its sovereign legislative discretion in such a fashion.

2. If the language of Section 4 of the Grant Agreement were to be interpreted as requiring the City Council to adopt the SEDA Plan and associated documents, it would be null, void *ab initio*, and unenforceable.

At Section 17, the General Terms and Conditions applicable to the grant award contract provide for severability "[i]n the event that any provision of this Agreement is unenforceable or held to be unenforceable." Standard Grant Conditions also provide for severability of unenforceable provisions, at Section 10.A.

However, "[t]he California Constitution provides that a county or city may make and enforce within its limits 'all local, police, sanitary, and other ordinances and regulations not in conflict with general laws.' (Cal. Const., art. XI, § 7.) From this police power, a California city derives its power to control land use and enact comprehensive land use and zoning laws." *Discovery Builders, Inc. v. City of Oakland*, 92 Cal.App.5th 799, 810, 310 Cal.Rptr.3d 241, 249 (2023) [citations omitted]. 2 CONT

Since land use regulations involve the exercise of police power (*Summit Media LLC v. City of Los Angeles,* 211 Cal.App.4th 921, 934, 150 Cal.Rptr.3d 574 (2012)), any agreement that functions to divest a municipality of its ability to exercise its police power with respect to land use laws is invalid. *Discovery Builders, supra*, 92 Cal.App.5th at 812. This responsibility extends to a city's consideration of an environmental impact report: "CEQA confers the duty upon the local lead agency to produce an adequate EIR" and this "statutory obligation may not be the consideration for a contract or promise, nor may the County bargain away its constitutional duty to regulate development." *Mission Oaks Ranch, Ltd. v. County of Santa Barbara,* 65 Cal.App.4th 713, 723 (1998), quoted in *Discovery Builders, supra*, 92 Cal.App.5th at 812.

Thus, the City of Fresno could not have obligated itself as a condition of grant approval to adopt the SEDA Plan, nor to approve the SEDA EIR. In this situation in particular, the EIR is so inadequate across multiple functions, chapters, and analyses that approval would constitute an abuse of discretion.

3. The City has violated material terms of its SB 2 agreement with HCD in the following respects: 3

guidelines.pdf) include plan adoption among Program Objectives (Section 101, subd. (a) and (b)), Eligible Uses for the funding (Section 302, subd. (a) and (b)). However, among Remedies of [sic] Non-performance, Section 603(c) suggests only that "Localities that do not formally adopt the funded activity could be subject to repayment of the grant." [emphasis added]

a. The City has failed to produce a Public Review Draft of the Infrastructure Plan, Infrastructure Financing Plan, and Fee Nexus Study.

At Section C, subsection 3 of the City's application for the planning grant that funded the SEDA Plan and PEIR, the City commits to using the funding in support of a State Priority Policy Area, specifically "Housing Related Infrastructure Financing and Fee Reduction Strategies." Under Section D, Proposed Activities Checklist, the City commits to item 15, "infrastructure financing plans." At Section E, Project Description, the City acknowledges that "an infrastructure assessment [and] fiscal nexus study must be completed prior to adoption [of a SEDA Specific Plan]." At Appendix A, the City recognizes explicitly that:

> "To implement a large-scale master planned community including infrastructure improvements and annexation, an analysis of the currently existing infrastructure, the infrastructure necessary to support development, and the gap is required. Additionally, the General Plan of the City of Fresno requires that all new annexations are fiscally neutral expansions to the City's General Fund budget. This requires a fiscal nexus study to show the anticipated costs and revenues associated with the annexation and mechanisms to fund any needed infrastructure gaps."

3 CONT

The costs of preparing the Infrastructure Assessment, Financing Plan, and Fee Nexus Study were built into the grant application, at a cost of $87,500.[3] The 2020 Consultant Services Agreement between the City and HCD incorporated these items as deliverables[4]. Nevertheless, as of the date of this writing, the studies, plans, budget, etc. are not available. In 2023, in response to requests for information from members of the public, the City admitted that it had such documents, but refused to make them public, claiming (without evidence or justification) that they were "privileged," that the public interest in keeping them secret outweighed the public interest in disclosing them, because the studies were "ongoing" (even though the Plan and its PEIR had already been released for public comment), and that disclosure of infrastructure cost estimates would provide "incomplete information."

Given the complexity of the SEDA planning project, and the fact that an infrastructure analysis, budget, plan, nexus study, and financing mechanisms are integral components of the SEDA Specific Plan *and have environmental impact ramifications*, the City's failure to release these documents with the Specific Plan and PEIR is a material breach of the City's commitments to HCD in accepting SB2 grant funding.

b. The SEDA Plan and Recirculated DPEIR show the City's grant application misrepresented that it would use SB 2 grant funding to "accelerate housing production."

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[3] City SB2 Planning Grants Application, Schedule F.

[4] Consultant Service Agreement between City of Fresno (City) and FirstCarbon Solutions (Consultant), Southeast Development Area Specific Plan, executed November 4, 2020, Scope of Services, Subtask 1.1.2, 1.1.3 – 1.1.7, 1.1.8 – 1.1.9, and Task 2.

The City's grant application, Section D, subsection 3, claimed the Plan would include "environmental analyses that eliminate the need for project-specific review." At Section E, Project Description, the City promised to deliver a Program EIR under which "future development will also utilize an expanded exemption under Government Code Section 65457 that will apply to certain residential, commercial, and mixed-use projects that are consistent with a specific plan adopted pursuant to Government Code, Article 8, Chapter 3 and would be exempt from CEQA."

The Government Code § 65457 exemption would create a no-new-EIR presumption for all projects within SEDA, unless somebody happens to become aware of and can make the case that the proposed development project requires "substantial changes" to the PEIR, that there have been "substantial changes" in circumstances requiring major revisions to the PEIR, and/or that there is new information unknown (and unknowable) at the time of PEIR certification. Public Resources Code § 21166.

This is all well and good when the Plan-level PEIR has accurately analyzed the environmental impact data, and has created the Plan-level coordinated mitigation structures that will realistically minimize cumulative impacts, either through Plan-level design and land use decisions or through enforceable conditions of project approvals. But the SEDA Plan EIR does not deliver on the promised "environmental analyses that eliminate the need for project-specific review."

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Generally, the SEDA draft PEIR unlawfully abdicates its responsibility to calculate impacts, disclaiming capacity to calculate impacts of the SEDA Specific Plan because site- and project-level planning have not yet been done. The PEIR essentially takes the position that Plan-level mitigation is impossible, as exemplified by its approach to air quality impacts: "*there is currently not enough information to quantify emissions* of specific project development that may occur under the proposed project. … *[D]ue to the size of the proposed {SEDA Plan] project,* there is not sufficient feasible mitigation available to reduce the potential criteria pollutant emissions associated with the proposed project to levels that would not exceed the Valley Air District thresholds of significance." PEIR, p. ES-6 [emphasis added].

In fact, the PEIR appears indifferent to the concept of plan-level mitigation. As drafted, impact analysis and mitigation either would occur on a piecemeal basis, as discretionary projects within the SEDA footprint come up for approval, or would not occur at all, as future SEDA development projects get a pass, falsely claiming approval of the PEIR means impacts have already been considered and mitigated, and using § 65457 to "tier" off phantom environmental impact analyses and nonexistent mitigation measures. This approach defeats one of the essential functions of a Program EIR, to "ensure consideration of cumulative impacts that might be slighted in a case-by-case analysis." CEQA Guidelines, § 15168(b)(2).

Here, the Plan promotes case-by-case environmental impacts analyses, as each SEDA development project is proposed. Similarly, determination and application of missing mitigation measures are deferred to environmental reviews of discretionary projects (if such environmental reviews are ever done), again one by one. The result at the Specific Plan level is

fatally deficient cumulative impact analyses, no (or illusory) mitigation to address cumulative impacts, and very few additional-analysis conditions on project-level entitlements. These failures of analysis show the City has failed to fulfill its commitment to create a Specific Plan that "accelerates housing production." 4 CONT

c. The City has failed to produce the streamlining checklist promised in its grant application.

The City's grant application, Section E, Project Description, promised that the Program EIR to be funded with SB2 grant monies "will include a detailed programmatic evaluation of activities to be carried out through [the] Specific Plan and will allow the City to incorporate feasible mitigation measures including a streamlining checklist to evaluate site specific operations within the scope of the program EIR. This use of streamlining will fast-track the production of much-needed housing for the City and the region."

This concept of streamlining meshes well with a Specific Plan calling for tens of thousands of units over 9,000 acres, to be implemented in a largely greenfield geography ten miles from the city's center. Such a checklist could incorporate many standard mitigation measures to reduce the massive environmental impacts that implementation of such a plan unavoidably entails. If the City had followed through on its commitment to include "environmental analyses that eliminate the need for project-specific review," deploying those analyses in a checklist format would have been an excellent strategy for expediting new-home construction. 5

However, neither the SEDA Plan, nor any of the three versions of the draft PEIR released to date, provides any such "streamlining checklist." Instead, both the Plan and the EIR repeatedly admit that the City will only evaluate "site specific" impacts within SEDA on a project-by-project basis, and will with each project start from scratch on whether there will be environmental review, whether there are impacts that meet the threshold of Public Resources Code 21166, and whether mitigation measures will be imposed, and if so which ones. (Please see comments, infra, regarding mitigation measures and the EIR as a tiering document.)

This approach is the very opposite of a "fast-track" to production of new housing, building both delays and expensive environmental reviews into discretionary development projects within the SEDA footprint.

4. The City cannot approve the SEDA Plan and EIR until it has a valid General Plan.

In its now-invalidated[5] 2021 Greenhouse Gas Reduction Plan, the City acknowledged that its 2014 General Plan was no longer compliant with new laws and regulations.[6] A general plan 6

[5] *South Fresno Community Alliance v. City of Fresno*, 2024 WL 3663122, August 6, 2024.

[6] City of Fresno GHG Reduction Plan Update, March 2021, pp. 1-1 (General Plan's Greenhouse Gas Appendix must be updated to comply with SB 32, CARB's Climate Change Scoping Plan, and the California Supreme Court's Newhall Ranch decision); and 1-2 (General Plan update required in order to bring it into conformance with current local and State law. CLC and RCI join, and incorporate by this reference, the portions of the March 24, 2025, comment letter submitted by Douglas Carstens and

must be reviewed and revised as circumstances warrant. Gov't Code § 65103, subd. (a); *DeVita v. County of Napa,* 9 Cal.4th 763, 792 (1995) ("the [planning] agency … is *required* periodically to review and *revise* the general plan to ensure that its elements remain integrated and internally consistent." [emphasis in original]). Above all, "the status of a general plan as the 'constitution' for the City's development requires that the plan be reasonably complete and current." *Camp v. Board of Supervisors,* 123 Cal.App.3d 334, 351, 176 Cal.Rptr. 620 (1981).

The level of housing need, and demand, is a crucial component of a city's land use planning decisions, and flows directly from the rate at which the city's population is growing. The City of Fresno's 2014 General Plan was based on an average annual growth rate of 1.24%[7]. However, the city is no longer growing at that robust pace. The City's March 2025 draft EIR for the West Area Neighborhood Specific Plan acknowledges this new reality, citing U.S. Census Bureau and California State Department of Finance data showing Fresno's growth at one-sixth the 2014 rate—0.2%—as of 2024.[8] Population growth out to 2035 for the whole City of Fresno is thus reduced from 2014 projections by approximately 184,000 residents[9]—well over the anticipated population of SEDA alone.

6 CONT

Approval of SEDA's 45,000-unit plan based on the 2014 General Plan's materially outdated and erroneous population projections and housing demand assumptions would be consistent with the 2014 General Plan, but also an abuse of discretion because contradicted by more recent and more accurate record evidence. This is the very reason a planning agency must keep its General Plan "reasonably complete and current."

5. If the 2014 General Plan is not invalidated by failure to comply with State mandates, changed circumstances, and new information, the SEDA EIR would have to be consistent with that General Plan. It is not.

a. The SEDA Plan's Consistency analysis is fatally flawed.

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The Draft PEIR offers a General Plan Consistency Analysis at p. 3.11-24 to -37, Table 3.11-1. However, many of the consistency determinations sound more like Orwellian double

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Michelle Black on behalf of the Sierra Club, Central Valley Partnership, and League of Women Voters that relate to the General Plan's failures to comply with AB 170 (Gov't. Code § 65302.1—General Plans must incorporate specified air pollution information) and SB 1000 (Gov't. Code § 65302(h)(2)—General Plans must incorporate an Environmental Justice element).

[7] City of Fresno 2014 General Plan, p. 1-24.

[8] Recirculated Draft EIR – West Area Neighborhoods Specific Plan, p. 3.12-1, Table 3.12.1—Environmental Setting—Demographics--Population Trends.

[9] The 2014 General Plan projects 226,000 new residents by 2035 (p. 1-23); Department of Finance growth projections would result in only about 22,877 new city residents during that period (calculated from Department of Finance's predicted 41,594 County population growth, multiplied by historical City of Fresno 55% share of county population increases). See also, fn. 11, infra.

speak[10] than planning professionals' analysis. A few examples (of many) follow. They have in common that they rely on unquantified assertions unsupported by record evidence, and/or in fact contradicted by the evidence in the record.

UF-12: "Locate roughly one-half of future residential development in infill areas—defined as being within the City on December 31, 2012— including the Downtown core area and surrounding neighborhoods, mixed-use centers and transit-oriented development along major BRT corridors, and other noncorridor infill areas, and vacant land. *Consistency Determination*: Consistent. The proposed project is consistent with the City's strategy to focus on infill development within existing City limits. The proposed project would minimize the City's outward expansion while promoting vibrant, sustainable communities." SEDA EIR, p. 3.11-26.

IN FACT: Not consistent. Approval of SEDA would torpedo the General Plan's goal of ensuring approximately one-half of future residential development would occur in infill areas. (See, UF-13, *infra*.) Moreover, the proposed project itself is the very antithesis of "infill," since it is not located within the City limits and does not in any other way resemble infill. Its siting outside the very farthest southeast rim of the City *maximizes* outward expansion, and the massive additional infrastructure that must be built to serve it will create a growth-inducing dynamic far from the infill areas that are the focus of the 2014 General Plan. Finally, the expenditures on those SEDA-serving infrastructure projects will suck resources away from the billions of dollars in infrastructure construction, replacement, improvement, and repair that would "promot[e] vibrant, sustainable communities" within the City limits.

7 CONT

UF-13 "Locate roughly one-half of future residential development in the Growth Areas—defined as unincorporated land as of December 31, 2012 SOI—which are to be developed with Complete Neighborhoods that include housing, services, and recreation; mixed-use centers; or along future BRT corridors. *Consistency Determination*: Consistent. The proposed project is a comprehensive plan for the nearly 9,000-acre Southeast Growth Area. The proposed project concentrates residential development in Neighborhood Town Centers, consistent with the General Plan concept of complete neighborhoods." SEDA EIR, p. 3.11-26.

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IN FACT: Not consistent. Approval of SEDA would torpedo the General Plan's goal of limiting development in Growth Areas to one-half of new residential construction. Due to reduced population projections, and concomitant reduced housing demand, the

[10] "**Doublespeak** is language that deliberately obscures, disguises, distorts, or reverses the meaning of words. Doublespeak may take the form of euphemisms (e.g., 'downsizing' for layoffs and 'servicing the target' for bombing), in which case it is primarily meant to make the truth sound more palatable. It may also refer to intentional ambiguity in language or to actual inversions of meaning. In such cases, doublespeak disguises the nature of the truth. Doublespeak is most closely associated with political language used by large entities such as corporations and governments." Wikipedia, https://en.wikipedia.org/wiki/Doublespeak, accessed March 19, 2025 [bolded emphasis in original; internal links and footnotes omitted].

whole city of Fresno will need only about 7,600 new housing units by 2035. The SEDA's 2035 target is 14,900, almost twice the number needed[11] for the entire city during that period, and perversely incentivizing suburban sprawl[12] over the infill development the General Plan seeks to promote. 8 CONT

LU-2 "Plan for infill development that includes a range of housing types, building forms, and land uses to meet the needs of both current and future residents. *Consistency Determination*: Consistent. The proposed project provides for the development of a range of housing types, building forms, and land uses to meet the needs of both existing and future residents." SEDA EIR, p. 3.11-26. 9

IN FACT: Not consistent. As is apparent from the Project Description[13], SEDA is a greenfield plan, not an infill plan. However well-planned they may be, SEDA's 9,000 acres are located far from the portions of the City that could reasonably meet the 2014 General Plan's definition of "infill" in UF-12, *supra*.

LU-4 "Enhance existing residential neighborhoods through regulations, code enforcement, and compatible infill development. *Consistency Determination*: Consistent. The proposed project would design and implement a vision that would allow new growth to occur without negatively affecting existing neighborhoods. 10

IN FACT: Not consistent. The SEDA Specific Plan and EIR include no analyses, policies, or provisions that could conceivably affect regulations, code enforcement, or infill development in existing neighborhoods in the City of Fresno, except negatively. Far more likely, adoption of the Plan would extinguish possibilities for new infill development, including by sapping resources needed for infill-supporting infrastructure

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[11] Assuming, based on state Department of Finance 2035 projections: Fresno County population increase of 41,594 people x 55% (historical City of Fresno share of population growth) = 22,877 people, ÷ 3 (average number of persons/dwelling unit) = 7,626, total dwelling units needed to accommodate population growth in the entire City of Fresno by 2035.

[12] This dynamic has been well documented. See, e.g., Patterns of Sprawl in Fresno and the Central San Joaquin Valley, Freemark, Fu, Rosenow, Su, May 2024, p.8 (copy attached): "As sprawl redirects growth from one part of a metropolitan area to another, one additional consequence is that housing development becomes rare in jurisdictions and neighborhoods with low incomes and low demand, since developers can respond to demand for homes by building at the far edge of regions, where there are low land costs and high demand (Freemark 2022). This may lead to low-income neighborhoods experiencing disinvestment and decay, while high-income, suburban neighborhoods benefit from the majority of private and public investment." Accord, Fresno Urban Decay Analysis, ECONorthwest, 2023 (copy attached).

[13] "The predominant existing use in the Plan Area (approximately 5,000 acres) is agriculture, primarily vineyards, orchards, and vegetable farms. The average parcel size is approximately 25 acres and is typically used for growing a range of crops. The Plan Area also contains agriculture-related and commercial operations, such as plant nurseries, wineries, and other various agricultural businesses." SEDA Recirculated Draft PEIR, p. 2-4.

improvements and for the repairs and maintenance that legacy neighborhoods need to avoid falling into blight and decay. 10 CONT

LU-5 "Plan for a diverse housing stock that will support balanced urban growth, and make efficient use of resources and public facilities. *Consistency Determination*: Consistent. The proposed project would design and implement a vision that would allow the City to grow in ways that equitably expand the economy and housing stock while protecting public health. The proposed project represents an opportunity to meet emerging market demands, provide much-needed diversity in housing stock, and enrich communities with safe, walkable, and inspiring urban environments."

IN FACT: Not consistent. The SEDA Plan, proposing intensive development of a 9,000-acre greenfields site, will require massive new construction of public facilities, whereas "efficient use" of resources and public facilities would dictate that the City satisfy its future housing needs in an area where such facilities already exist, such as the West Area Neighborhood Plan area, or the thousands of infill sites within the city limits. The effect of new growth into SEDA will not promote equity nor "enrich" existing neighborhoods (where Fresno's low-income housing stock is located), but will deprive those neighborhoods of resources they need to fight blight and decay. The Plan does not impose conditions of entitlement on SEDA developments that would be at all likely to supplement the City's stock of low-income housing. Finally, the public health protection claim here flies directly in the face of the air quality impacts data in the PEIR Appendix B, which show huge unmitigated increases in air pollutants, toxic air contaminants, and diesel particulate matter. Notwithstanding CEQA and California Supreme Court mandates, the EIR fails to calculate the ozone pollution that Plan development would generate, or to provide a human health impact analysis. A claim that the plan protects human health, on this record, is facially false. 11

LU-9 "Plan land uses, design, and development intensities to supplement and support, and not compete with, the Downtown. *Consistency Determination*: Consistent. The proposed project is a comprehensive plan for the nearly 9,000-acre Southeast Growth Area, located to the east of the Downtown. The proposed project concentrates residential development in Neighborhood Town Centers, consistent with the General Plan concept of complete neighborhoods. These uses would support the Downtown but would not compete with the Downtown." 12

IN FACT: Not consistent. The SEDA Plan area is ten miles from Fresno's Downtown. *At best* it will compete with Downtown, drawing away the private investments and public institutions that give an urban downtown core its crucial role in a city's life. More likely, the SEDA development will make it impossible for the City to supplement state grants to ensure completion of downtown infrastructure upgrades, essential to a thriving downtown.

b. The SEDA Specific Plan violates California's Planning and Zoning Law in that its leapfrog approach to growth fundamentally contradicts the 2014 General Plan objectives, violating consistency requirements. 13

California Government Code § 65454 provides that "[n]o specific plan may be adopted or amended unless the proposed plan or amendment is consistent with the general plan." As of 2018, the Legislature's amendment of Government Code § 65700 applied this consistency requirement also to charter cities such as Fresno. *Kennedy Commission v. City of Huntington Beach*, 91 Cal.App.5th 436, 443, 308 Cal.Rptr.3d 461, 468 (2023), reh'g denied (June 7, 2023), review denied (July 19, 2023).

Apart from and in addition to the many errors in the PEIR's General Plan Consistency Analysis (see section 5.a., *supra*), the SEDA Plan is inconsistent in that it upends the 2014 General Plan's proposed growth trajectory, which calls for SEDA development to occur last, after Development Areas 1 and 2.[14] The General Plan explains that "[t]he pace of new development in the Development Areas needs to be balanced with the City's goals for achieving significant reinvestment within the 2012 City Limits."[15]

In its 2014 General Plan, unusually for Fresno, the City Council purposefully declined to expand the City's Sphere of Influence based on a reasoned analysis of the effects suburban sprawl had created and would create into the future if not curbed. The 2014 General Plan explicitly chose a different path:

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> Continued growth outwards creates transportation and air quality issues, as well. The continued siting of major retail and commercial uses, as well as jobs, at Fresno's urban fringe is lengthening travel times and increasing traffic levels (and air pollution) disproportionately faster than the rate of population growth, due to inefficient location selection. Given the restrictions on and impacts of increasing Fresno's land area, the Plan promotes the highest and best use of land within Fresno's current city limits, phases growth into unincorporated areas of the SOI, and avoids de-investment in Downtown and established neighborhoods. Furthermore, certain patterns of land development can increase costs to the City in excess of related revenues and essentially reduce fiscal resources. The Plan seeks to discourage this type of development and, at the least, ensure that all development covers its fair share of public costs.[16]

The SEDA draft PEIR attempts to explain away its inconsistency with these goals and objectives, acknowledging that "SEDA was intended to be developed once other infill initiatives were given time to gain momentum," and that "there is still ample residential capacity within the current city limits and in Growth Area I (which includes the Southwest Fresno and the West Area Neighborhoods Specific Plan areas)." But then the PEIR goes on to argue that "there is a

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[14] 2014 General Plan, Figure I-3, Residential Capacity Allocation, which shows Development Areas ("DA"s) in order of priority; SEDA comprises DA-3 Southeast and DA-4 East, the City's fifth- and sixth-level development priorities. The West Area Neighborhoods Specific Plan Area is labeled DA-1 North, and is the first-level priority for new development.

[15] Id. at p. 3-19.

[16] 2014 General Plan, Ch.7, Resource Conservation & Resilience—§7.2 Use of Infrastructure & Resources, p.7-7

sense of urgency about the current housing crisis and the City's ability to provide housing for the existing population and its natural growth as well as the unanticipated in-migration occurring at this time."[17]

But the facts do not support a "sense of urgency"—population growth has plummeted, taking with it the demand for new housing, and the City is already on track to adopt the proposed West Area Neighborhoods Specific Plan sometime in summer 2025.[18] The West Area Plan is likely to result in housing units long before SEDA, since the West Area Plan will be implemented upon a platform of already-existing (if still incomplete) infrastructure, whereas SEDA will require construction of all significant urban-supporting public improvements.[19] The West Area Plan alone will accommodate over 50,000 new housing units; when added to the 43,512 units[20] on parcels zoned and appropriate for housing within existing City limits, the City will not need SEDA to meet its housing needs for many decades. 13 CONT

To allow SEDA to jump the line into first place is antithetical to how the City has planned its growth. Such reorganizing of development priorities is inconsistent with the General Plan, and creates significant adverse fiscal and environmental consequences for the City and its existing neighborhoods that the 2014 General Plan specifically intends to avoid by its new-growth priorities hierarchy.

c. CLC and RCI incorporate comments submitted on behalf of County of Fresno.

In support of their comment that the draft PEIR cannot be adopted under the 2014 General Plan, CLC and RCI hereby join, and incorporate by this reference, the portion of the September 4, 2023 comment letter on the 2023 draft SEDA PEIR, submitted by Jeffrey Reid on behalf of the County of Fresno, Department of Public Works and Planning, at pages 5 through 6 (Section C). 14

6. The City cannot approve the SEDA Specific Plan until it has complied with the prerequisites imposed via LAFCO Resolution USOI-144.

CLC and RCI join, and hereby incorporate by this reference, the portions of the September 4, 2023 comment letter on the 2023 draft SEDA PEIR submitted by Jeffrey Reid, on behalf of the County of Fresno, Department of Public Works and Planning, pages 1 through 3 (Section A), 15

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[17] SEDA Recirculated Draft PEIR, p. 2-1. The PEIR neither documents nor otherwise refers to "in-migration," anticipated or otherwise.

[18] The West Area Plan was released for public comment on March 12, 2025, and is expected to go to the City Council during the summer. https://www.fresno.gov/planning/plans-projects-under-review/#west-area-neighborhoods-specific-plan.

[19] One of the important reasons the 2014 Plan put SEDA area last in line as a site for new housing was precisely that the area lacks public infrastructure to support extensive residential and commercial development. 2014 General Plan, p. 1-19.

[20] Fresno Multi-Jurisdictional Housing Element, December 2024, Table 1E-3.23: Housing Capacity by Community Plan/Specific Plan Area, p.1E-3-145.

and pages 10-11 (Section H).

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7. The SEDA Specific Plan violates California Planning and Zoning Law CEQA in that it omits components required by statute, and fails to meet standards for public involvement by failing to timely circulate for public comment an infrastructure plan and infrastructure financing plan.

a. Essential components are missing from the SEDA Plan documents.

California Government Code § 65451 mandates that every specific plan include certain "Required contents." Subsection (a) of the statute requires that a specific plan "include a text and a diagram or diagrams which specify all of the following in detail …

"(2) The proposed distribution, location, and extent and intensity of major components of public and private transportation, sewage, water, drainage, solid waste disposal, energy, and other essential facilities proposed to be located within the area covered by the plan and needed to support the land uses described in the plan.

…

"(4) A program of implementation measures including regulations, programs, public works projects, and financing measures necessary to carry out paragraphs (1), (2), and (3)."

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Neither the Specific Plan, nor the Recirculated Draft PEIR released for public comment on February 7, 2025 includes the text or diagrams specifying the "essential facilities proposed" for the Plan as required by § 65451(a)(2), nor the implementation and financing measures required by § 65451(a)(4).

b. The City has failed to release timely for public comment the missing components of the SEDA Plan proposal.

In adopting Title 7, Division 1, Chapter 3 of the Government Code, addressing Local Planning and Zoning, the California Legislature declared its intent "to provide an opportunity for each city and county to coordinate its local budget planning and local planning for federal and state program activities, such as community development, with the local land use planning process…" Cal. Gov't Code § 65300.9.

The SB2 Planning Grants Application included, at Schedule F, a Project Timeline and Budget, which called for release of the Public Review Draft of the Infrastructure Financing Plan and the Nexus Study at least three months in advance of City Council consideration of the Plan and associated documents. Nevertheless, and notwithstanding the explicit strictures of the statute, and promises made throughout the Specific Plan and its PEIR, the City has failed to release either an infrastructure plan disclosing the details required by § 65451(a)(2), or an infrastructure budget, nexus study, and financing plan, as required by § 65451(a)(4).

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Especially pertinent to the fiscal wisdom of City investment in SEDA infrastructure: the Consultant Service Agreement required a Qualitative Fiscal Review, but as of this writing, in the last few days of the public comment period for the Recirculated draft PEIR, no such review has been made public. Such a review should clarify "whether or not the existing targeted tax

sharing parameters will remain feasible with the development of the SEDA Specific Plan."[21]

Withholding from the public such critical information is inconsistent with provisions of both the Planning and Zoning Law, and of CEQA. See, e.g., Cal. Gov't Code § 65351,[22] Pub. Res. Code § 21000, et seq. ("If CEQA is scrupulously followed, the public will know the basis on which its responsible officials either approve or reject environmentally significant action, and the public, being duly informed, can respond accordingly to action with which it disagrees. The EIR process protects not only the environment but also informed self-government." *Golden Door Properties, LLC v. Superior Court of San Diego County*, 53 Cal.App.5th 733, 763, 267 Cal.Rptr.3d 32, 55 (2020), as modified on denial of reh'g (Aug. 25, 2020) [citations omitted].) 17 CONT

c. Failure to timely disclose documents related to SEDA infrastructure expenditures defeats CEQA's requirement that all environmental impacts be disclosed, considered, and mitigated where possible.

i. Environmental impacts of construction and operation of infrastructure are neither disclosed nor mitigated.

Constructing utilities and other needed infrastructure for 9,000 acres' worth of residences, schools, businesses, parks, etc., will require grading, excavating, paving, and other soil-disturbing activities that beyond peradventure will generate air pollution and greenhouse gases, among other impacts. Operation of the infrastructure will entail still further impacts. The PEIR simply claims that project-level construction mitigation measures will be adequate to mitigate all impacts. However, given that the PEIR fails to mitigate air quality impacts for non-infrastructure activities, the additional impacts infrastructure construction will have on air quality must be analyzed in terms of the extent to which they will cumulatively contribute to air pollution. Operational impacts must also be evaluated. 18

ii. The PEIR Project Description fails to include information now known about infrastructure needs, or to calculate the environmental effects of those parts of the project.

The PEIR Project Description represents that at the time of circulation the City had already done infrastructure analyses, referencing a "Public Facilities Financing Plan" (p.2-3), and an Infrastructure Plan with "more closely specified" details about types of infrastructure to be constructed in the Specific Plan area.[23] But the Recirculated PEIR includes none of the descriptive information required by Government Code § 65451(a)(2), nor analysis either of the 19

[21] Consultant Service Agreement between City of Fresno (City) and FirstCarbon Solutions (Consultant), Southeast Development Area Specific Plan, executed November 4, 2020, Exhibit A, Attachment A: Scope of Services, Task 1.2.

[22] Addressing public involvement in proceedings related to a general plan, and made applicable to Specific Plan preparation, adoption, and amendment by Government Code § 65453(a).

[23] See, p.2-8, roads; p.2-17, "sustainable infrastructure," not otherwise specified; p.2-18, "holistically coordinated infrastructure," not otherwise specified.

construction or the operational impacts of supplying that infrastructure, violating CEQA's express purpose that agencies "give 'major consideration' to preventing damage to the environment when conducting their regulatory functions. (Pub.Resources Code, § 21000(g).)" See, *Santiago County Water Dist. v. County of Orange*, 118 Cal.App.3d 818, 829-831, 173 Cal.Rptr. 602, 607-609 (1981) [failure to account for impacts related to project water delivery facilities]. See also, *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus,* 27 Cal.App.4th 713, 730, 32 Cal.Rptr.2d 704 (1994), as modified (Sept. 12, 1994) [omission of reference to wastewater treatment plant recognized as necessary to the project resulted in an improperly "curtailed" and "distorted" project description.]

19 CONT

iii. The draft PEIR neither discloses nor mitigates environmental impacts of directing billions of dollars into SEDA infrastructure, forcing scarce city resources away from existing neighborhoods.

Although one of the claimed Project Objectives of the SEDA Plan is "fiscal responsibility," including "self-financing for the development and ongoing maintenance of the SEDA that does not reduce City of Fresno resources dedicated to other areas of the City or burden Fresno residents outside of the SEDA,"[24] the Plan provides no evidence of such a "self-financing" approach to infrastructure. On the contrary, the Plan repeatedly promises that when infrastructure capacity falls short, the City will step in and pay.[25] The as-yet-undisclosed documentation of infrastructure needs and funding mechanisms must either substantiate the fiscal responsibility of the Plan, or not. As of this moment, the public has no idea because there is no evidence in the record for the City's claim that development and ongoing maintenance will be "self-financing."

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Unless there is proof of the "self-financing" claim, SEDA commits the City to massively expensive infrastructure that is <u>not</u> needed to accommodate Fresno's housing needs, and that directly conflicts with the General Plan by privileging new growth over strengthening established neighborhoods. In addition, it foreseeably, substantially, contributes to physical blight and decay, with resulting economic decline, in all non-SEDA areas of the City.[26]

As in *Bakersfield Citizens for Local Control v. City of Bakersfield*, 124 Cal.App.4th 1184, 1208, 22 Cal.Rptr.3d 203, 222 (2004), the SEDA PEIR has failed to comply with the information disclosure provisions of CEQA because it has omitted any meaningful consideration of the question whether the diversion of funding for infrastructure improvements could trigger a series of events that ultimately cause urban decay. Nor does the PEIR even contain a statement indicating that such a possibility had been considered, or reasons why it had been determined

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[24] SEDA Recirculated Draft EIR, passim, including pp. ES-2, 2-18.

[25] For example, mitigation measures HYD-2b and HYD-2c require the City to "secure additional water supplies by securing additional water sources" where a proposed SEDA development would exceed existing water supply capacity.

[26] See, Fresno Urban Decay Analysis, ECONorthwest, 2023 (copy attached); see also, Patterns of Sprawl in Fresno and the Central San Joaquin Valley, 2024, p.8 (copy attached).

that urban decay was not a significant effect of the proposed project. 20 CONT

d. CLC and RCI incorporate comments submitted on behalf of County of Fresno

In support of their comment that the draft PEIR fails to include adequate planning details (including regarding public infrastructure) to permit a sufficient degree of analysis and public information regarding the environmental consequences of such a large greenfield development, CLC and RCI hereby join, and incorporate by this reference, the portions of the September 4, 2023 comment letter on the 2023 draft SEDA PEIR, submitted by Jeffrey on behalf of the County of Fresno, Department of Public Works and Planning, at pages 3 through 5 (Section B), and page 7 (Section D). 21

e. City must extend the public comment period on the SEDA Plan for 45 days after the infrastructure plan, infrastructure budget, nexus study, and financing plan have been released for review.

Failure to timely release the infrastructure-related studies and analyses for public comment deprives the public of a meaningful opportunity to comment upon substantial adverse environmental impacts of the proposed project or a feasible way to mitigate or avoid such an effect that the project's proponents have declined to implement. CEQA Guidelines, § 15203, requires the lead agency to "provide adequate time for other public agencies and members of the public to review and comment on a draft EIR or negative declaration that it has prepared." 22

It may be that the disclosure of the infrastructure documents constitutes significant new information within the meaning of Pub. Res. Code § 21092.1 or CEQA Guidelines § 15088.5(a) that requires recirculation of the PEIR. Even if not, the infrastructure information is crucial to evaluation of SEDA's environmental impacts. Therefore, the infrastructure documents are also subject to the 45-day public review period required by CEQA Guidelines, § 15105(a).

8. The SEDA Recirculated draft PEIR's Existing Conditions description is fatally inaccurate.

In its Introduction chapter, the SEDA draft PEIR includes a current city population figure, but no population projections. (p. 2-3 – 2.21) Projected population growth data appears, instead, in an "Existing Conditions" segment of the Population and Housing chapter. There, the PEIR describes historical population increases in the City and the County, using 2022 Census Bureau Quick Facts figures. (SEDA PEIR, pp. 3.14-1 – 2, fn. 1, 2.) It relies on California Department of Finance for Fresno's average household size. (*Id.*, p.3.14-2, fn. 3.)

However, on the crucial question of projected population growth, the Recirculated PEIR continues to rely on Fresno Council of Governments' (FCOG) 2021 Fresno County growth projections to 2050, apparently last accessed May 20, 2022. (p.3.14-2, fn. 5.) The City's use of the FCOG figures in 2022 may have been the best information available at the time; there is no way to know, as the PEIR does not explain its choice of data sources. 23

But the PEIR has now been recirculated twice since the July 2023 release of the first version of the draft, once in October of 2023, and again in February of 2025 (current version). Well prior to the October 3, 2023 partial recirculation of the draft PEIR, the City was aware that the SEDA

EIR's population assumptions were materially inaccurate.[27] As of August 2023, the California Department of Finance (DOF) had issued updated data very different from that cited in the July 2023 draft EIR.[28] However, the October 2023 Partial Recirculated draft PEIR did not incorporate any corrections to its population projections.

In August of 2024, the Fifth District's *South Fresno Community Alliance* decision invalidated the City's General Plan update and Greenhouse Gas plan, requiring the current recirculation of the SEDA PEIR. By September of 2024, DOF had again updated its data to incorporate a finer-grained analysis, and as of October of 2024, FCOG had corrected its own data based on the new information issued by the state.

In December of 2024, the City paid First Carbon Solutions an additional $153,636 to author a second Recirculated draft PEIR; at that point, the accurate DOF and FCOG population data were readily available. In fact, when one now follows the link provided in the Recirculated PEIR at footnote 5 on page 3.14-2, one finds FCOG's October 2024 updated data, which show a Fresno population in 2025 of 595,370 (not the PEIR's 621,540[29]). FCOG's updated data report a 2050 Fresno City population of 646,260 (not the PEIR's 728,200). The accurate, FCOG, data show a Fresno City increase of 50,890 people between 2025 and 2050, not the almost 107,000 predicted in the PEIR. The accurate, FCOG, data yield only an additional 16,963 households by 2050, well under half of the 35,553 households the PEIR's figures would project.[30]

23
CONT

These errors in growth projections are fundamental: According to SEDA, its plans for 45,000 new housing units would comprise planned growth of only 31% percent of the total planned capacity for the City.[31] However, using accurate, FCOG, growth figures, it is clear that SEDA development would amount to almost *three times* (265%) the actual housing needs for all of Fresno City by 2050. Such a glut of new homes on the market, and the public investment necessary to launch it, would shatter the General Plan's goals for infill development and revitalization of Fresno City existing neighborhoods.

In its Reasons for Recirculation, the SEDA document describes *South Fresno Community Alliance*'s invalidation of prior planning documents as constituting "substantial changes to the environmental setting," and therefore "significant new information" requiring recirculation (p. ES-9); but the PEIR does not include corrected data nor otherwise respond to commenters'

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[27] CLC and RCI hereby incorporate by this reference the comment letter submitted by Keith Bergthold, dated August 28, 2023, and those portions of the August 28, 2023, comment letter submitted by Patience Milrod on behalf of CLC, IAF, and RCI, at pages 3 through 5. (copies attached)

[28] Please see Keith Bergthold August 28, 2023, comment letter.

[29] SEDA PEIR, at p. 3.14-2.

[30] At 3 persons per household, the SEDA PEIR Fresno City population growth figures would yield 35,553 new households.

[31] PEIR, p. 3.14-13 – Section 3.14.4 - Project Impacts and Mitigation Measures.

critique of population projections.[32] Nor does the Recirculated draft PEIR explain why it relies on outdated and inaccurate data, except to say (using circular reasoning) that "This approach is consistent with requirements to maintain consistency with the General Plan." (p. 3.14-2.) This statement can only be read as an acknowledgement that the draft PEIR incorporates erroneous data into its environmental impact analyses—not only affecting calculations of housing demand, but also other impacts such as water quality, air quality, transportation, greenhouse gases, and infrastructure design, sequencing, and cost.

23 CONT

A knowing use of false data is antithetical to CEQA's purpose of accurately informing decision makers and the public, especially when the plan in question creates such extensive unmitigated impacts on the environment as this one.

9. The SEDA draft PEIR fails to address Fresno's documented housing needs, proposing instead a more than doubling of the oversupply of single-family detached units.

The Plan itself does not commit to any particular number of homes at any particular price point; nor does it require as a mitigation measure that developers build so as to ensure any proportion of affordable-to-market-rate homes. But based on the SEDA proposed zoning map[33], and on the City's application for the SEDA planning grant[34], the SEDA Plan anticipates at most 9,000 potentially affordable multifamily units[35] and 35,200 single-family units.

As it happens, the City's own One Fresno Housing Strategy acknowledges that the City's pressing needs are not for the single-family market-rate housing SEDA will supply, but for housing affordable to low-income residents: "Historic poor land use planning, inequitable fair housing practices and the basic imbalance of supply and demand have all led Fresno to its current state of needing approximately 15,000 new and converted affordable housing units between now and 2025 to meet our residents' needs." One Fresno Housing Strategy, April 2022, Mayor's Message, p. 2.

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The One Fresno Housing Strategy makes clear that "Fresno needs 21,001 units for households who can afford no more than $500 on monthly housing costs," and "the City of Fresno has a glut of 28,310 single-family detached units over and above what Fresno households need based on household size." *Id.* at p. 38. These are not housing needs that SEDA's 35,200 additional

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[32] In the 2025 West Area Neighborhoods Specific Plan draft EIR, the City acknowledged the new population reality of 0.2% growth, a small fraction of the growth assumed in the SEDA PEIR. See, Recirculated Draft EIR – West Area Neighborhoods Specific Plan, p. 3.12-1, Table 3.12.1—Environmental Setting—Demographics—Population Trends.

[33] Southeast Development Area Specific Plan, Map 2.5—SEDA Proposed Land Use, p. 22.

[34] Fresno City SB 2 Planning Grants Application, Section E, Project Description, p. 6.

[35] Based on HCD's zoning standard of at least 16 units per acre (see, HCD By-Right Program Minimum Densities Table). However, density standards are only a rough proxy for affordability; at this point—since the PEIR includes no enforceable mitigation measures imposed as conditions of entitlement—it is possible that not a single unit to be built in SEDA will be affordable to low-income families.

single-family market rate homes will meet.

The City's own quantified assessment of Fresno's housing needs[36] over most of the next decade shows more than adequate inventory for that new housing; not a single parcel from SEDA is needed to meet those goals.[37]

The SEDA Specific Plan's claim that "the acceleration of the current housing crisis has created a 'substantial shortage' of homes and therefore prioritized completion of the SEDA Plan"[38] is demonstrably untrue. This claim cannot therefore be the basis for legitimate, evidence-based findings of overriding consideration.

24 CONT

10. The SEDA draft PEIR fails to analyze or to mitigate foreseeable and avoidable impacts on farmland.

CLC and RCI hereby join, and incorporate by this reference, the portions of the September 4, 2023, comment letter on the 2023 draft SEDA PEIR, submitted by Jeffrey Reid on behalf of the County of Fresno, Department of Public Works and Planning, found at pages 7 through 10 (Sections E, F, and G).

CLC and RCI hereby join, and incorporate by this reference, the portion of the March 24, 2025, comment letter submitted by Douglas Carstens and Michelle Black on behalf of the Sierra Club, Central Valley Partnership, and League of Women Voters entitled "Agricultural Resources and Forestry Resources Impacts are Not Sufficiently Mitigated."

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11. Traffic impacts

a. The Recirculated SEDA draft PEIR materially underestimates VMT by significantly overestimating trip capture within SEDA.

i. At the time of recirculation, the City was aware of the PEIR's failure to accurately estimate VMT.

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In support of their comment that the draft PEIR fails to accurately estimate VMT, CLC and RCI hereby incorporate by this reference the following comment letters submitted on the 2023 draft

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[36] See, FRESNO MULTI-JURISDICTIONAL HOUSING ELEMENT, July 2023: Figure 1E-2.2 Sites Inventory, Fresno 2023, p. 1E-2-33; and Table 1E-1.1, Summary of Quantified Objectives, 2023-2031, p. 1E-1-35.

[37] The SEDA PEIR admits as much at p. 2-1: "While there is still ample residential capacity within the current city limits and in Growth Area I (which includes the Southwest Fresno and the West Area Neighborhoods Specific Plan areas), there is a sense of urgency about the current housing crisis and the City's ability to provide housing for the existing population and its natural growth as well as the unanticipated in-migration occurring at this time." The PEIR includes no evidence justifying this supposed "urgency," and California Department of Finance population growth figures flatly contradict it. Moreover, they do not reflect any "unanticipated in-migration occurring at this time," and the EIR offers no evidence in support of this apparently fictitious phenomenon.

[38] Draft SEDA Specific Plan, p. 9.

SEDA PEIR:

- California Department of Transportation, David Padilla, submitted August 25, 2023.
- California Department of Transportation, David Padilla, submitted November 17, 2023.
- Victoria Transport Policy Institute, Todd Litman, submitted August 21, 2023.
- Sunnyside Property Owners Association, Sue Williams, submitted August 25, 2023.
- County of Fresno, Department of Public Works and Planning, Jeffrey Reid, submitted November 7, 2023.
- CLC, IAF, and RCI, Patience Milrod, submitted August 28, 2023.
- CLC, IAF, and RCI, Patience Milrod, submitted November 6, 2023.

ii. VMT figures must be recalculated.

Notwithstanding multiple comments submitted after the release of each of the two 2023 PEIR drafts, the Recirculated draft PEIR has failed to correct the counterfactual assumptions it makes about internal trip capture within SEDA, fails to provide VMT per service population data for years prior to 2035, and continues simply to assert that VMT per service population will drop from 45.72 to 5.07 without addressing or explaining omission of interim-years data. Moreover, it incorrectly identifies a 2035 buildout horizon—though such a timeline conflicts with the General Plan estimate of only new 14,900 units in SEDA by that date, is not physically feasible, and inaccurately reflects the Specific Plan's buildout timeframe.[39] 26 CONT

Professionally adequate analysis would recognize that realistically only second-generation SEDA residents will be able to work, go to school, shop, and recreate within SEDA's boundaries to the extent claimed, since commercial and employment centers will lag a decade or two behind housing development and occupancy. This serious analytic error in turn generates drastically underestimated traffic impacts, which in turn results in material undercounting of air quality impacts, which in turn would invalidate any human health impact analysis based on these data, if such an analysis had been done.

As Victoria Transport Policy Institute points out, "the Plan's current analysis significantly underestimates vehicle traffic congestion, crash, emission and resulting air quality impacts. Until more accurate travel modeling can be completed, and air quality impacts adjusted, this PEIR fails to predict the project's significant social and environmental impacts and so fails to provide the information that policy makers, practitioners and the general public need to make informed decisions." (August 25, 2023 comment letter, p.2.)

CalTrans' letter notes that SEDA will create a VMT impact because it cannot accurately claim trip capture for decades after the project begins to be built out, as residential uses (which produce trips) are followed, "slowly over time," by commercial uses (trip attractors). CalTrans

[39] See, e.g., Recirculated SEDA draft PEIR at p. ES-1, anticipating "approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050."

quantifies the net VMT increase from No Project Conditions as 162% and contradicts the PEIR's claimed VMT per service population claim.

CEQA Guidelines, § 15064.3(b)(4) allows a lead agency to choose a methodology by which to evaluate vehicle miles traveled but requires that "[a]ny assumptions used to estimate vehicle miles traveled and any revisions to model outputs should be documented and explained in the environmental document prepared for the project." The PEIR's choice of a 2035 horizon is unreasonable. In addition, the PEIR does not inform the reader how it calculates VMT either for the years between the project's initiation and its 2035 horizon, nor provide any data out through the (more realistic) 2050 actual buildout period. The PEIR's analysis is subject to Guidelines § 15151's standard of adequacy: "An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible." The missing calculations are reasonably feasible but have not been incorporated into the PEIR and their omission is unexplained. 26 CONT

b. Traffic mitigation measures must be updated based on corrected data and analysis.

The 2025 PEIR does acknowledge, as the 2023 draft did not, that the Specific Plan "could conflict" with a program or policy related to transportation. (p. 3.17-31.) It claims the Specific Plan "is a comprehensive planning document" that "addresses wide-ranging infrastructure and community challenges" related to future growth. But, while noting that "[p]lanning at this scale allows design and phasing of infrastructure improvements that are more efficient, environmentally sensitive, and cost-effective," the Plan in fact incorporates no such design or phasing information.

Notwithstanding the almost one million daily trips the project will generate,[40] and commenters' requests for quantifiable and enforceable mitigation measures, the Recirculated draft PEIR identifies exactly the same mitigation measures as the original draft PEIR. There is no evidence of effort to plan comprehensively, or at scale, to design and phase infrastructure so as to mitigate environmental impacts from VMTs. Instead, all mitigation measures defer mitigation to the implementing project level, except possibly MM TRANS-1d (bus service). The cumulative impacts analysis is likewise deferred to project-level approvals. (SEDA draft PEIR, pp.3.17-44 – 45.) 27

In its Executive Summary Matrix, the draft PEIR claims that the SEDA Specific Plan "would not conflict or be inconsistent with CEQA Guidelines, § 15064.3(b)" (Table ES-1, p.ES-51), and lists that Guideline's criteria for assessing significance of transportation impacts at p.3.17-34. However, the PEIR fails to provide sufficient accurate information to establish whether, or how, the rebuttable presumption of no significant transportation impacts would legitimately apply to the SEDA Specific Plan: The Plan imposes no enforceable mitigation measures as conditions of project-level approvals to ensure siting within 0.5 miles of transit; and, the claim that SEDA planning would reduce VMT below existing conditions is unsustainable on the evidence in the

[40] Plan Area VMT with the project build out in 2035 is expected to be 974,369. SEDA Recirculated draft PEIR, p.3.17-32

draft PEIR.

What the draft PEIR does not give us is a reasoned explanation of why it has not adopted, at the Plan level, the many recommended mitigation measures that could make accurate the Plan's claim to comprehensive planning. These include the mitigation measures suggested in CalTrans' August 2023 letter, the Emission Reduction Clean Air Measures recommended by the San Joaquin Valley Air Pollution Control District (copy attached), and the City's own 2020 VMT threshold guidelines document, which points out that "regional VMT mitigation is considered the most effective method for large-scale VMT reduction," and provides multiple mitigation options for community and general plans.[41] As required by Section 15126.4 of the State CEQA Guidelines, "Where several measures are available to mitigate an impact, *each should be discussed* and the basis for selecting a particular measure should be identified. *Formulation of mitigation measures shall not be deferred until some future time*." [emphasis added]. This draft PEIR fails to fulfill this function. 27 CONT

12. The SEDA Recirculated draft PEIR fails to adequately analyze or mitigate greenhouse gas emissions from the SEDA project

CLC and RCI hereby join, and incorporate by this reference the portions of the March 24, 2025 comment letter submitted by Douglas Carstens and Michelle Black on behalf of the Sierra Club, Central Valley Partnership, and League of Women Voters that relate to the PEIR's assessment, analysis, disclosure, and mitigation of greenhouse gas emissions due to SEDA projects' construction and operation activities. 28

13. The SEDA Recirculated draft PEIR fails to adequately identify, quantify, or mitigate air quality impacts.

a. The draft PEIR must include ozone calculations.

The draft PEIR's Air Pollution Description and Health Effects discussion lists criterion pollutants, generally describes their adverse effects on human health, and identifies the regulatory programs intended to curb air pollution, including the ozone reduction/prevention plans for the San Joaquin Valley Air Basin nonattainment area. However, there is no discussion of the human health impacts of the additional pollution load this project contributes to Fresno's already-dirty air. 29

The PEIR does not calculate the anticipated parts per million (ppm) of ozone resulting from SEDA construction and operations; although NOx and ROG are estimated, the reader has no idea how much ozone will be produced (i.e., whether the amount of ozone resulting from the ROG and NOx pollution will bring the ozone ppm within the 0.10 to 0.40 range). Given that the measures for both the precursor pollutants exceed their respective thresholds of significance,

[41] CEQA Guidelines for Vehicle Miles Traveled Thresholds (Fresno CEQA VMT Guide), adopted June 25, 2020, City of Fresno, p.40; for mitigation measures, see, Appendix C, Vehicle Miles Traveled Mitigation Measures for Community Plans and General Plans.

this omission renders the draft PEIR's air quality analysis inadequate. *Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, 520.

The ozone discussion must, of course do more than calculate the NO_x + ROG figure but must also factor in the rising temperatures being experienced and expected to increase over the project implementation period. See SJVAPCD Redesignation Request, Appendix B: Analysis of Meteorology Affecting Ozone Levels, p. B-8:

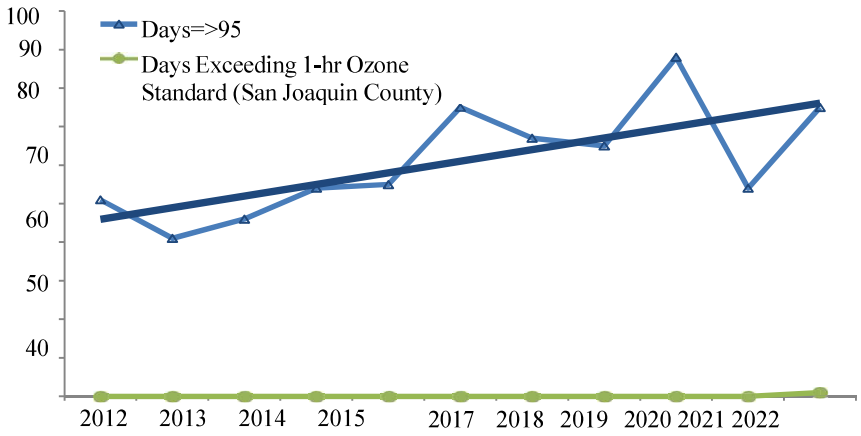

Figure B-7 Number of Days per Year with High Temperatures ≥ 95°F at Stockton Airport (May-October) and Days Exceeding the 1-hour Ozone NAAQS (2012-2022)

As importantly, ozone calculations must be based on an accurate VMT figure derived from realistic, evidence-based VMT projections that correct for the excessively optimistic internal trip capture assumptions of this Draft PEIR.

29 CONT

b. The draft PEIR must include a human health impact analysis

The PEIR fails to include an analysis that correlates the project's emissions of air pollutants to its impacts on human health, rendering the draft PEIR's air quality analysis inadequate. *Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, at pp. 517-520.

Because ozone is not confined to the site where it is generated, piecemealing human health impact analyses on a development-by-development basis, as the draft PEIR proposes, both grossly understates the health impacts, and makes their mitigation effectively impossible.

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Moreover, the draft PEIR deliberately misleads the public and decision makers about the seriousness of the air quality impacts SEDA will create, by discussing ROG separately from NOx, and asserting that "direct exposure to ROG would not … result in health effects." See, p. 3.3-58. There is no mention of the toxic cocktail that ROG creates when it combines with NO_x in the heat of a Central Valley summer afternoon. But ozone's effects on humans, especially children, are not trivial:

SJVAPCD describes ozone impacts in its Community Emission Reduction Program

approved for SEDA-adjacent South Central Fresno[42]: "Breathing ozone can trigger a variety of health problems, including chest pain, coughing, throat irritation, and congestion. It can reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue. Children are at a greater risk of experiencing negative health impacts because their lungs are still developing and they are more likely to be active outdoors when ozone levels are high, thus increasing their exposure. Studies have linked rising hospital admissions and emergency room visits to higher ozone levels." Appendix G: Health Impacts of Air Pollution, p. G-17.

Fresno State University's Central Valley Health Policy Institute studied emergency room and hospital admissions in Fresno, Bakersfield, and Modesto on a daily basis for selected conditions, such as asthma and acute myocardial infarction (MI), that had been previously linked to air pollution in other studies. They determined that ozone was strongly linked to increased risk for asthma ER visits in children during the hottest summer months. Moreover, asthma ER admissions are also strongly linked to increasing $PM_{2.5}$ across the Valley, with a higher risk in children. Further, risk for asthma hospitalizations increased dramatically with $PM_{2.5}$ in children and adults across the region. A moderate increase in risk of acute MI (heart attack) was also linked to $PM_{2.5}$ levels regionally, as were pneumonia ER visits in children and acute bronchitis ER visits in adults.[43]

Dr. Emanuel Alcalá advised in his September 6, 2023, comment letter (copy attached and incorporated by this reference) that "incremental increases in ozone levels alone—independent of the other pollutants the project will create—will have the following human health impacts: decreased lung function, decreased lung function growth in children, increased asthma-related emergency visits and hospital admissions, and mortality among older adults."

30 CONT

The PEIR is inadequate because, as in *Bakersfield Citizens*, "After reading the EIR[], the public would have no idea of the health consequences that result when more pollutants are added to a nonattainment basin." (*Bakersfield Citizens, supra,* at p. 1220.) The PEIR does not explain why it includes no quantified health impact projections "to inform the public how its bare numbers translate to create potential adverse impacts," nor to "explain what the agency *does* know and why, given existing scientific constraints, it cannot translate potential health impacts further." (*Friant Ranch, supra*, 6 Cal.5th at p. 521 [emphasis in original].) The PEIR offers no "explanation why it was not feasible to provide an analysis that connected the air quality effects to human health consequences." *Id.*, 6 Cal.5th at p. 522.

In fact, such analysis is feasible, and should have been conducted here. In 2020, after the *Friant Ranch* decision, the Sacramento Metropolitan Air Quality Management District adopted

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[42] http://community.valleyair.org/selected-communities/south-central-fresno, incorporated by this reference.

[43] Capitman & Tyner, The Impacts of Short-Term Changes in Air Quality on Emergency Room and Hospital Use in California's San Joaquin Valley, California State University, Fresno, June 2011.

Guidance to Address the Friant Ranch Ruling for CEQA Projects in the Sacramento Metro Air District (copy attached), which sets out procedures for conducting a health effects analysis that would meet the Supreme Court's standard for disclosure of adverse health effects resulting from a CEQA project. The procedures rely on the Benefits Mapping and Analysis Program (BenMAP), a U.S. Environmental Protection Agency (USEPA) tool that estimates health impacts from ozone and $PM_{2.5}$. At Section 6 and Appendix A. the Guidance provides technical procedures and details; at Appendix G it correlates emissions levels and pollutants with "health endpoints"[44] by geographic region and age range for strategic area projects.

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As Dr. Alcalá pointed out to the City in September of 2023, "the tools with which to conduct [a human health effects analysis] are readily available. For example, the Environmental Benefits Mapping and Analysis Program – Community Edition (BenMAP-CE) – not only estimates health impacts but also estimates economic values associated with health morbidity events." BenMAP, or some similar program, should and could have been used here to provide the information the public and decisionmakers need—including an assessment of ozone impacts on human health.

c. The PEIR is inconsistent with air quality attainment status, and conflicts with and obstructs implementation of the applicable air quality plan.

While the draft PEIR acknowledges as "a significant and unavoidable impact" that implementation of SEDA will conflict with and obstruct applicable air quality plans, it does not specify which plans, nor does it quantify the degree to which SEDA will obstruct their implementation. (See, p.3.3-42 – 43.)

A review however of the draft PEIR's Appendix B can garner some idea of how SEDA air quality impacts will harm efforts to ensure healthy air in the Fresno Region. One example is comparing the PEIR's air quality impacts analysis with the San Joaquin Valley Air Pollution Control District's "Proposed 2023 Maintenance Plan and Redesignation Request for the Revoked 1-Hour Ozone Standard" (SJVAPCD Redesignation Request) adopted by the Air District Board on June 15, 2023.[45] The purpose of that document is to persuade the federal Environmental Protection Agency to terminate anti-backsliding provisions for the revoked 1-hour ozone standard, including Section 185 nonattainment fees. Toward that end, the document includes both proofs of compliance and a maintenance plan. It clearly does not factor in the ozone contributions SEDA would make to the Valley's pollution load.

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Specifically, SJVAPCD's Redesignation Request, Appendix A: Emissions Inventory (pp. A-1 through A-4), projects annual anticipated pollution levels for NO_x through 2036. A layperson—including a member of the public, the Planning Commission, or the City Council—gets a

[44] These include: hospital admissions, all respiratory; mortality, non-accidental; emergency room visits, asthma; hospital admissions, asthma; mortality, all cause; hospital admissions, all cardiovascular (less myocardial infarctions); acute myocardial infarction, nonfatal.

[45] See, SJVAPCD 2023 Maintenance Plan and Redesignation Request for the Revoked 1-Hour Ozone Standard —see https://ww2.valleyair.org/rules-and-planning/air-quality-plans/ozone-plans/.

graphic idea of SEDA's impact just by comparing the Air District's *all-Valley* numbers in identified years to the numbers *this project alone* will generate.

NO_x —summer average in tons/day[46]

Year	Entire San Joaquin Valley, per SJVAPCD	SEDA, per PEIR	SEDA % increase over total SJV
2026	119.50	180.529	151.07%
2031	97.49	170.8218	175.22%
2036	84.13	168.2333	199.97%

This chart illustrates SEDA's huge and negative effect on Valley air quality: by 2036, SEDA alone is projected to produce double the amount of NO_x being produced *across the entire rest of the San Joaquin Valley*. The document provides changes in VOC over time and does not sum up ROG separately; it will therefore be important for an adequate SEDA ozone analysis to determine, and to include as a point of comparison, how SEDA ROG emissions will compare to regionwide ROG production during the identified years, in order to report accurately the extent to which SEDA will impede achievement of regionwide air quality improvement goals. 31 CONT

The PEIR must acknowledge these data, explain them in the context of the SEDA proposal, and provide fact-based analysis of the proposal's air quality impacts that take these data into account. The draft PEIR's passing confession that "Emissions of VOC and NO_X that exceed the Valley Air District regional threshold would cumulatively contribute to the ozone nonattainment designation of the SJVAB" (p. 3.3-56) is inadequate. Exceedances at this scale require some effort beyond falling back on General Plan mitigation measures that never anticipated impacts of this magnitude.

d. Plan level and project level mitigation measures are inadequate, amounting to piecemealing of SEDA's regional air quality impacts.

The draft PEIR fails to propose plan-level mitigation measures that will have <u>any</u> mitigating effect on air quality impacts, although many tools and other resources are available for this purpose. The PEIR takes the position that plan-scale mitigations are infeasible, but this is inaccurate: the City's own 2020 VMT threshold guidelines document provides multiple mitigation options for community and general plans.[47] It is objectively unreasonable, and an invitation to piecemealing that will defeat the whole purpose of a mitigation program, to 32

[46] See, SJVAPCD *Adopted 2023 Maintenance Plan and Redesignation Request for the Revoked 1-Hour Ozone Standard*, Appendix A: Emissions Inventory, p. A-4. Copy attached; available at https://www.valleyair.org/Workshops/postings/2023/06-15-23/maintenance-plan.pdf; last accessed March 24, 2025.

[47] See, e.g., Fresno CEQA VMT Guide, and SJVAPCD Emission Reduction Clean Air Measures—among many others.

suggest that it is impossible to impose plan-scale mitigation measures as enforceable conditions of development in SEDA.

The draft PEIR falsely claims that it has adequately canvassed and incorporated available air quality mitigation measures, but that "due to the magnitude of emissions generated by the residential, office, and commercial land uses proposed as part of the proposed project, no mitigation measures are available that would reduce cumulative impacts below the Valley Air District's thresholds." That the PEIR cannot find measures to reduce (for example) 2026 NO_x emissions from 180 tons per year to 10 does not mean there are *no* possible mitigations that would reduce NO_x emissions to (for example) 50: "Mitigation measures need not include precise quantitative performance standards, but they must be at least partially effective, even if they cannot mitigate significant impacts to less than significant levels." *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 404; §§ 21051, 21100; Guidelines, § 15370. It is not an option in 2025 to effectively abandon the effort, when air pollution from this project would so massively exceed the entire total NO_x output for the rest of the San Joaquin Valley, creating avoidable illness and death, and dooming City efforts to reduce climate change impacts.

Such specific mitigation measures as the plan does include are to be implemented at the project level; only AIR-1a imposes use of low-VOC paints ("super-compliant architectural coatings") as a condition of approval. The others (AIR-1b through AIR-4) do not impose mitigation obligations unless preconditions are met. For AIR-1b and -1c (respectively, construction- and operation-related air impacts), there is no need for air quality mitigation measures unless the *project* impacts exceed the Air District threshold of significance. By definition, project-level emissions will have (relative to the SEDA Plan as a whole) minimal potential impact on the environment.

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CONT

For AIR-1d, mitigation for emission of Toxic Air Contaminants (TAC) or Diesel Particulate Matter (DPM) pollutants is only required at the project level, and only if *both* of two conditions are met: 1) if such emissions will occur within 1000 feet of a sensitive receptor; *and* 2) if a Health Risk Assessment shows incremental health risks for those sensitive receptors exceed Air District levels. Thus, a development project within SEDA could freely emit unmitigated TAC and/or DPM so long as it is not sited near a sensitive receptor. This is a perverse outcome, defeating the purpose of SEDA, increasing in an unmeasured and unmitigated manner the toxic contaminants to which the general public will be exposed, and putting even non-sensitive receptors at unnecessary risk.[48]

Not surprisingly, though the PEIR acknowledges significant cumulative air quality impacts, the

[48] It is also contrary to best practices, according to the Air District. SJVAPCD comments on a Fresno community plan did *not* recommend limiting mitigation to uses near sensitive receptors, but rather prescribed one of two types of health impact analysis for *every* development project within the plan area. See, comments on Recirculated Notice of Preparation of an Environmental Impact Report for Revisions to the Fresno South Central Specific Plan, May 14, 2021, p. 6, available at https://community.valleyair.org/media/1ywkdo1a/district-comments-20210313-nop-fresno-south-central-specific-plan-5-14-21.pdf

project-by-project approach to the issue would allow many projects to avoid air quality mitigation entirely, thus precluding effective mitigation of cumulative impacts. Thus, the Specific Plan's cumulative air quality impacts remain, according to the PEIR, "significant and unavoidable."

Piecemealing a project such as SEDA to avoid imposing mitigation is no more defensible than piecemealing to avoid environmental review. As the Fifth District pointed out in *Los Angeles Dep't of Water & Power v. Cnty. of Inyo*, 67 Cal. App. 5th 1018, 1035, 283 Cal.Rptr. 3d 119, 130 (2021), "CEQA contemplates consideration of environmental consequences at the earliest possible stage, even though more detailed environmental review may be necessary later. [Citation.] Consistent with this view, CEQA's requirements cannot be avoided by chopping a large project with significant adverse consequences into many little ones—each with a minimal potential impact on the environment. [Citation.] Piecemeal review is contrary to CEQA's requirements." The PEIR fails to demonstrate an honest effort to accurately calculate and to reduce VMTs, or an honest effort to apply any of the many available technologies, mechanisms, and strategies to mitigate air quality impacts. It fails as the informational document CEQA requires.

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Moreover, the draft PEIR does not sufficiently account for its lack of specificity by assurances that a "Health Risk Assessment" (HRA) will be prepared later in the CEQA process, in connection with development-specific EIRs. (See, e.g., MM AIR-3.1, -3.2.) *Sierra Club v. County of Fresno*, supra, 6 Cal.5th at p. 521. For one thing, an HRA is required by the California Health & Safety Code, § 44306, only to evaluate and predict the dispersion of hazardous substances. Secondly, a project-specific HRA is inadequate for assessing plan-scale impacts or for devising plan-scale mitigation measures—the very purpose of a Program Environmental Impact Report, but not remotely achieved by the SEDA draft PEIR.

The draft PEIR also fails to propose mitigation measures that will significantly reduce transportation impacts, including dangerous levels of air pollution. Although the project triples vehicle miles traveled to almost 1 million per day, mitigation measures are absent or illusory. For the first two decades of the project's operation, its transportation and consequent air quality impacts are huge, both as a result of the concept itself—a new city of 145,000 planted in rural Fresno, 10 miles from the city's urban center—and of an apparent determination to impose no mitigation that might inconvenience or cost SEDA developers and builders.

14. The PEIR is inconsistent with the Housing Element of the City's General Plan.

The draft PEIR undermines the Housing Element's corrective approach to decades of poor planning. Fresno's 6th cycle draft Housing Element acknowledges that "growth in the City of Fresno over the past few decades has traditionally been low density suburban development, which has resulted in conditions of sprawl in various areas of the city." Fresno Multi-Jurisdictional Housing Element July 2023, Appendix 1E: City of Fresno, p.1E-4-1.

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The Housing Element therefore proposes to fill a perennial critical gap in the City's capacity to provide and upgrade housing in legacy neighborhoods: "As part of the implementation of the

Housing Element, programs are identified to upgrade the city's infrastructure as needed in low- and moderate-income neighborhoods with the greatest needs. *Priority for infrastructure projects will be given to serving established neighborhoods*, including generally south of Herndon Avenue as shown in Figure 1E-3.41: Priority Areas for Development Incentives, along BRT and enhanced transit corridors, and in the Downtown Planning Area, consistent with General Plan policies." Housing Element, p.1E-3-119 [emphasis added].

A City decision to invest billions of dollars in SEDA infrastructure is inconsistent with the Housing Element's commitment to correct the City's history of neglecting older neighborhoods. In the zero-sum game of municipal finance, and especially in the absence of a SEDA infrastructure financing plan, there is no way to ensure adequate resources to fund "Priority Investments in Established Neighborhoods" as already identified in the General Plan.[49]

33 CONT

Again, consistently with the General Plan, the 6th Cycle Housing Element inventory does not identify parcels in SEDA as necessary to meet Regional Housing Needs between now and 2031. See, Figure 1E-2.7 at p. *1E-2-67*. Instead, the Housing Element identifies SEDA as Development Area 3, as does the General Plan—the last in priority for development on the fringe areas. See, Housing Element, Figure 1E-3.42, which shows Growth Area 2 to include SEDA, labeled "DA-3" for Development Area 3. "Growth Area 2 has significantly less access to completed infrastructure. Any development in these areas would require all infrastructure costs to be borne by the new development." 1E-3-121.

15. The SEDA draft PEIR fails to adequately analyze or mitigate project water impacts.

a. Water impacts are badly underestimated.

It appears the City has not factored drought conditions or climate change projections into its water supply sustainability calculations. Figure ES-2, Projected Water Supplies[50], shows an increase of almost 21,000 AFY in available groundwater between 2025 and 2045, plus another 6,500 AFY increase in surface water over the same period.

However, the draft PEIR recognizes that across California, climate change will effect a "reduction in the quality and supply of water from the Sierra snowpack,"[51] a source on which the City of Fresno is heavily reliant for both surface water and groundwater recharge. The Draft PEIR reports that by 2050, such impacts in the Fresno area will reduce the average water supply from snowpack to two-thirds historical levels, and "If emissions reductions do not occur, water from snowpack could fall to less than one-third of historical levels by 2100."[52]

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Not only are these concerns not discussed in the Plan or the draft PEIR, but they are explicitly

[49] See summary in December 2024 draft Housing Element, p. 1E-3-119.

[50] Draft PEIR, Appx. F, p. ES-7.

[51] Draft PEIR, p. 3.8-9 (warmer temperatures could reduce the Sierra Nevada spring snowpack "by as much as 70 to 90 percent.")

[52] *Id.*, p. 3.8-10.

minimized in the discussion of hydrology and water quality. There, the PEIR proposes a cheerful water outlook, repeating in multiple places the phrases "during normal water years" and "assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA."[53] These are objectively unreasonable assumptions, but there is no discussion of a fallback position in the (likely) event the PEIR's sunny projections are inaccurate.

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b. Mitigations for hydrology impacts are inadequate; City taxpayers will bear the cost.

Not only are the projections unreasonably optimistic, but this is yet another place where the City's failure to do the program-level work of infrastructure planning, accurate environmental assessment, and imposition of mandatory, system-wide, coordinated mitigation measures predictably exacerbates environmental impacts.

Mitigation measures HYD-2b and HYD-2c require the City to refuse to approve proposed SEDA developments that would exceed "existing water supply capacity," and to "secure additional water supplies by securing additional water sources" prior to any such development approvals. This post-facto proposed mitigation—the costs of which are scheduled to be borne by City taxpayers and not by SEDA's developers or ultimate residents—is far inferior to plan-level mitigations prescribed in a Program EIR.

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To achieve plan-level efficiencies and effectiveness, the City must disclose, and the draft PEIR must discuss, the "EIR-related water infrastructure planning tasks."[54] An intention to develop this vital information after SEDA approvals would violate CEQA.

c. CLC and RCI incorporate comments submitted on behalf of County of Fresno.

In support of their comment that mitigations of water supply impacts are inadequate, CLC and RCI hereby join, and incorporate by this reference, the portions of the September 4, 2023, comment letter (copy attached) submitted by Jeffrey Reid on behalf of the County of Fresno, Department of Public Works and Planning, pages 11 through 12 (Section I).

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16. The PEIR piecemeals assessments of environmental impacts, and mitigations.

The City's 2020 application to HCD for the SEDA planning grant committed to project streamlining as one of the SEDA plan's deliverables by incorporating "environmental analyses that eliminate the need for project-specific review."[55] This would have been a good idea, in light of the City's claim that it needs SEDA in order to expedite thousands of urgently needed new homes.

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If the City *had* conducted the environmental analyses it promised to do, it would also have been able to keep another of the promises it made to HCD: a Program EIR under which "future development will also utilize an expanded exemption under Government Code Section 65457

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[53] *Id.*, p. 3.10-8.

[54] SEDA Specific Plan, pp. 100-109, *passim*.

[55] Fresno City SB 2 Planning Grants Application, Section D, Proposed Activities Checklist, item 3, p. 5.

that will apply to certain residential, commercial, and mixed-use projects that are consistent with a specific plan adopted pursuant to Government Code, Article 8, Chapter 3 and would be exempt from CEQA."[56]

The Plan pays lip service to streamlining, promising "Fiscal Responsibility" by "holistically coordinat[ing] infrastructure to integrate efficiencies that piecemeal planning cannot," and otherwise coordinating systems and networks for efficiency and economy.[57]

But the Plan and the draft PEIR fail to provide either plan-scale impact analysis or plan-scale mitigation measures; the draft PEIR itself repeatedly prescribes both environmental assessment and imposition of mitigation measures only during the City's approval process for subsequent discretionary projects within the SEDA footprint—for air quality impacts (see section 13.d, *supra*), transportation impacts, water supply impacts, etc. That is, if SEDA is approved as proposed, the City will need to subject every new project to environmental review in order to determine if its impacts are potentially significant, and what mitigation measures should be imposed—exactly the process streamlining is intended to avoid.

Statements by City officials have made this intention clear, most explicitly from City spokesman Brandon Johansen, whose email to a reporter admitted "As individual projects are filed within the Southeast Development Area, they will be evaluated under CEQA to determine project impacts and mitigation measures."[58] Such an approach makes streamlining impossible (unless the idea is to use the PEIR to evade environmental review and mitigation for follow-on projects, which has been known to happen in Fresno). Absent streamlining, the City cannot accomplish its claimed goal of expediting housing production. 37 CONT

As importantly, this approach renders impossible "holistic coordination of infrastructure to integrate efficiencies that piecemeal planning cannot," much less creating systems and networks for efficiency and economy.

Finally, a project-by-project evaluation of air quality, water supply, and transportation impacts makes effective mitigation of SEDA's large-scale environmental degradations illusory at best. A 9,000-acre project area, planted at such a remove from the city's center, requires creative and transformative approaches to the environmental consequences of its placement and its population. Piecemealing precludes effective mitigation.

17. The SEDA draft PEIR's alternatives analysis fails to satisfy CEQA requirements.

CEQA Guidelines, § 15126.6, provides guidance for conducting an adequate alternatives analysis. A reasonable alternative to a project may involve implementing it at a different 38

[56] SB 2 Planning Grants Application, Section E, Project Description.

[57] Draft PEIR at pp. ES-2, 2-18, and 5-11.

[58] Greg Weaver, *Another Clovis, but in southeast Fresno? City moves forward on mega-development plans, Fresnoland*, August 25, 2023; https://fresnoland.org/2023/08/25/city-of-fresno-eyes-seda/; accessed August 27, 2023.

location, as long as it "would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project." § 15126.6(a). Subdivision (c) of the Guideline can make consideration of a different location mandatory: "The range of potential alternatives to the proposed project *shall* include those that could *feasibly accomplish most of the basic objectives* of the project and could *avoid or substantially lessen one or more of the significant effects*." [Emphasis added.]

Except for developers with inventory in the SEDA area, it should be a matter of indifference where exactly the City lawfully exercises its planning and zoning powers to incentivize adequate production of needed housing. Although "the housing crisis" is the putative justification for this Specific Plan at this time (see, fn. 37, *supra*), the Plan does not propose solutions to the housing crisis Fresno actually has: too few homes affordable to those at low and very low incomes, and an oversupply of detached single-family homes for above-moderate income buyers.[59] Section 9, *supra*. While the SEDA Plan pays lip service to providing housing at all income levels, without question a plan serious about ensuring production of even some low-income housing must actively require and incentivize it, not just hope it appears if the plan is adopted; this plan makes no such provisions. Moreover, population growth has dropped significantly (see, section 8, *supra*); logically, housing demand is also dropping[60] and will likely continue to drop.

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CONT

This is the *accurate* description of the Environmental Setting/Existing Conditions within which SEDA is being proposed. Whether SEDA is wise public policy is not a CEQA question. But CEQA does require that decisionmakers seriously consider the tradeoffs even when acting foolishly, and that the public be fully aware of the costs of the choices their electeds are making for them.

Here, the Objectives of the Plan are set forth at pp. 5-11 – 5-12 of the EIR, a dreamy litany of smart-growth measures that conserve resources and foster community. Sadly, when subjected to comparative scrutiny, not one of these objectives can be better accomplished in a sprawl-inducing greenfields project like SEDA than in an already-urban part of the city. It certainly appears to the lay observer that the Plan's resource-oriented objectives (coordinated infrastructure, resource-conserving techniques for public facilities, efficient use of energy, water and other resources, and reduction of energy and water consumption) are more likely in a location where infrastructure has already been built, and which can be improved or converted

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[59] The office of Fresno Mayor Jerry Dyer issued in April of 2022 a report entitled *One Fresno Housing Strategy*, which concluded that, *as of that date*, "Fresno needs 21,001 units for households who can afford no more than $500 on monthly housing costs," and "the City of Fresno has a glut of 28,310 single-family detached units over and above what Fresno households need based on household size." *Id.* at p. 38.

[60] Since the City has not responded to the Public Records Act request for the housing market study it apparently commissioned in connection with SEDA, these commenters are reduced to trawling the internet for pertinent data. According to one internet site, as of the end of February 2025, home sales had dropped 8.4% year over year, and were on average on the market 8 more days than for the same period last year. See, https://www.redfin.com/city/6904/CA/Fresno/housing-market, last accessed March 24, 2025.

to new uses depending on the project's needs. The SEDA alternative, to the contrary, will require billions of dollars in new infrastructure—the very opposite of resource conservation, and incompatible with the Plan's "fiscal responsibility" objective.

Other objectives, such as fostering healthy activity by providing walking and bicycling routes to activity centers, convenient transit service, walkable neighborhoods, mixed use town centers, and innovative employment areas, are geography-neutral: there is no need to create a new town on greenfields to provide these amenities for Fresno residents. In fact, the Housing Element commits the City "to upgrade the city's infrastructure as needed in low- and moderate-income neighborhoods with the greatest needs. *Priority for infrastructure projects will be given to serving established neighborhoods*." December 2024 draft Housing Element, p. 1E-3-119 [emphasis added].

The housing-related objectives are, likewise, geography-neutral—theoretically provision of housing affordable to all income levels and a wide variety of housing choices could be accomplished anywhere. However, unless the still-missing infrastructure financing plan calls for the City itself to fully absorb the expense, the massive cost of providing infrastructure to SEDA will make these objectives much harder to accomplish than they already are: these expenditures will inflate costs-per-square-foot; recouping those costs from SEDA homebuyers, renters, and business owners will create at least some drag on marketability, or will reduce the developers' return on investment. The possibility that lower-income housing could emerge from such a scenario is wildly unrealistic. 38 CONT

Finally, even if the SEDA Plan could create the perfect new town at the southeast corner of Fresno's sphere of influence, it would do so at a huge environmental cost to the region as a whole—including but not limited to the air quality, traffic, and water quality/access concerns itemized here and in other comment letters. It is unlikely that the SEDA Plan would be the environmentally superior alternative when compared to housing provision in existing urban areas of the city.

a. The City must consider an Infill/No-Project Alternative.

The City already has in hand a recent inventory of a sufficient number of suitable parcels to meet Fresno's housing needs in its December 2024 Housing Element draft. Facilitating housing development using the Housing Element as a blueprint is likely to yield all of the benefits and significantly reduced environmental impacts from construction and especially from operation.

An Infill Alternative is far likelier to meet many of the Plan's objectives, including creating housing affordable to the Fresnans who really need it. Recent state statutes privileging infill and low-income housing development, combined with a baseline of existing infrastructure, also create a pathway to expedited housing development—which is what you need in a crisis. 39

The SEDA draft PEIR must include an evaluation of this alternative, which *could feasibly accomplish most of the basic objectives of the project* and *could avoid or substantially lessen one or more of the significant effects* (§ 15126.6(a) [emphasis added]), to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed

project. CEQA Guidelines, § 15126.6(e)(1).

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b. The City must consider a West Area Neighborhood /No-Project Alternative.

On March 12, 2025, the City finally released a Recirculated Specific Plan draft EIR for the West Area Neighborhoods. Again, this Plan provides for over 50,000 new homes, in an area already at least partially built out, with at least a baseline of existing infrastructure, and where at least some development would qualify under state procedures for expediting affordable housing.

Again, the West Area Neighborhoods Alternative is far likelier than the SEDA Plan itself to meet all of its objectives, with significantly reduced environmental impacts from both construction and operation. Environmentally, this is a second-best alternative to the Infill Alternative, since the West Area is a new growth area and will be developed less-densely than housing under an Infill concept. 40

The SEDA draft PEIR must include an evaluation of this alternative, which *could feasibly accomplish most of the basic objectives of the project* and *could avoid or substantially lessen one or more of the significant effects* (§ 15126.6(a) [emphasis added]), to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project. CEQA Guidelines, § 15126.6(e)(1).

18. On this record, a statement of overriding considerations to approve the PEIR would be an abuse of discretion.

On the basis of the current record, it will be impossible for the City Council to make evidence-based findings that "specific overriding economic, legal, social, technological, or other benefits of the project outweigh the significant effects on the environment" (Public Resources Code, § 21081 (b)), or that the "unmitigated effects are outweighed by the project's benefits." (Laurel Heights, supra, 47 Cal.3d at p. 391.) 41

Conclusion

There is no emergency requiring immediate approval of this development plan. The City's own draft Housing Element establishes that there is more than adequate site inventory within the existing City to accommodate anticipated housing demand for at least eight years. More importantly, adoption of this plan at this time will utterly defeat its claimed principal purpose, to facilitate streamlined housing production by anticipating and mitigating at a program scale the environmental impacts of such development. 42

The City must correct erroneous population projections and otherwise gather corrected data, use the correct tools to assess impacts, identify effective and enforceable plan-scale mitigations, and fully disclose those facts and analyses. Given the size and scale of the SEDA proposal, and the need to bring the General Plan into conformity with statutory and judicial mandates, it may make most sense to roll its environmental assessment into a General Plan update.

Please include my clients (see cc's, below) and me on the notification list for next steps in this process. Thanking you for your attention to these matters, I remain,

Very truly yours,

PATIENCE MILROD
Attorney for Fresno Madera Tulare and Kings Counties Central Labor Council, and Regenerate California Innovation

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GUIDANCE TO ADDRESS THE FRIANT RANCH RULING FOR CEQA PROJECTS IN THE SAC METRO AIR DISTRICT

SACRAMENTO METROPOLITAN
AIR QUALITY MANAGEMENT DISTRICT
SACRAMENTO, CALIFORNIA

RAMBOLL

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Prepared for
Sacramento Metropolitan Air Quality Management District
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ACRONYMS AND ABBREVIATIONS

AAQS:	Ambient Air Quality Standards
APCA:	Anthropogenic Precursor Culpability Assessment
AQMDs:	Air Quality Management Districts
AQTSD:	Air Quality Technical Support Document
ARB:	California Air Resources Board
BAAQMD:	Bay Area Air Quality Management District
BenMAP:	Benefits Mapping and Analysis Program
CAMx:	Comprehensive Air Quality Model with Extensions
CCOS:	Central California Ozone Study
CEQA:	California Environmental Quality Act
CMAQ:	Community Multiscale Air Quality
CO:	Carbon Monoxide
C-R:	Concentration-Response
CSAPR:	Cross-State Air Pollution Rule
DDM:	Decoupled Direct Method
DPM:	Diesel Particulate Matter
EC:	Elemental Carbon
EIR:	Environmental Impact Report
EMFAC:	Emissions Factor (ARB's on-road mobile source emissions model)
EPA:	United States Environmental Protection Agency
FF10:	Flat File 2010
FPRM:	Fine Particulate Matter
GHGs:	Greenhouse Gases
GIS:	Geographical Information System
HDDM:	Higher Order Decoupled Direct Method
ISAM:	Integrated Source Apportionment Method
ISORROPIA:	Aerosol Thermodynamic Module
MERPs:	Modeled Emission Rate Precursors
MRGUAM:	Gridded merge program
NAAQS:	National Ambient Air Quality Standard
NH_4:	Ammonium

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NH_4NO_3:	Ammonium Nitrate
NO_2:	Nitrogen Dioxide
NO_3:	Nitrate
NO_X:	Oxides of Nitrogen
O_3:	Ozone
OA:	Organic Aerosol
OC:	Organic Carbon
OSAT:	Ozone Source Apportionment Technology
PGM:	Photochemical Grid Model
PM:	Particulate Matter
$PM_{2.5}$:	Particulate Matter 2.5 micrometers or less in diameter
PM_{10}:	Particulate Matter 10 micrometers or less in diameter
POA:	Primary Organic Aerosol
Project:	CEQA project
PSAT:	Particulate Source Apportionment Technology
QA:	Quality Assurance
QC:	Quality Control
ROG:	Reactive Organic Gases
Sac Metro Air District:	Sacramento Metropolitan Air Quality Management District
SCC:	Source Classification Code
SFNA:	Sacramento Federal Ozone Nonattainment Area
SIPs:	State Implementation Plans
SMOKE:	Sparse Matrix Operator Kerner Emissions
SOx:	Oxides of Sulfur
SO_2:	Sulfur Dioxide
SO_4:	Sulfate
TOS:	Thresholds of Significance
USEPA:	United States Environmental Protection Agency
VOCs:	Volatile Organic Compounds

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1. INTRODUCTION

The California Environmental Quality Act (CEQA) is a state statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. A public agency must comply with CEQA when it undertakes an activity defined by CEQA as a "project." A project is an activity carried out by a public agency or a private activity that must receive some discretionary approval (meaning that the agency has the authority to deny the requested permit or approval) from a government agency, and that may cause either a direct physical change in the environment or a reasonably foreseeable indirect change in the environment. Air quality impacts of a proposed project are one of the environmental factors that are required to be evaluated under CEQA, and require mitigation unless the impacts can be shown to be insignificant. Air quality impacts typically include increases in criteria pollutants [e.g., ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO) and particulate matter (PM_{10} and $PM_{2.5}$)], greenhouse gases (GHGs), air toxics (e.g., diesel particulate matter, DPM), and the resultant health effects of increases in air pollutants.

The California Supreme Court, in the case of *Sierra Club v. County of Fresno* (2018) 6 Cal. 5th 502, determined that the air quality analysis in the environmental impact report (EIR) prepared under CEQA for the Friant Ranch Project was inadequate because it did not make "a reasonable effort to substantively connect the project's air quality impacts to likely health consequences." The Court determined that "the EIR should be revised to relate the expected adverse air quality impacts to likely health consequences or explain in meaningful detail why it is not feasible at the time of drafting to provide such an analysis."

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Lead agencies and practitioners preparing documents to comply with CEQA have requested guidance from the Sacramento Metropolitan Air Quality Management District (Sac Metro Air District) on implementing the Friant Ranch decision in the review and analysis of proposed projects in Sacramento County. On April 25, 2019, the Sac Metro Air District published an Interim Recommendation for addressing the Friant Ranch decision. The Interim Recommendation stated that agencies should follow the Court's advice to explain in meaningful detail why an analysis of likely health consequences resulting from a development project is not yet feasible. This explanation should describe the background underlying air regulations, the regional nature of the regulatory approach, and why the approach is not amenable to project-level assessments.

The Interim Recommendation stated that an expanded discussion of health impacts resulting from specific air pollutants may also be warranted for projects with emissions exceeding the Sac Metro Air District's thresholds of significance. The Interim Recommendation was put in place to assist lead agencies and practitioners with CEQA document preparation until the Sac Metro Air District developed a methodology that would provide a consistent, reliable and meaningful analysis to address the Court's direction on correlating health impacts to a project's emissions.

2. PURPOSE AND AUTHORITY

The Sac Metro Air District is one of 35 air districts in California responsible for local air quality planning, monitoring, and stationary source permitting. Sac Metro Air District covers Sacramento County, including the cities of Sacramento, Citrus Heights, Folsom, Rancho Cordova, Elk Grove, Galt, and Isleton.

Under the CEQA review process, Sac Metro Air District may serve as the lead agency, a responsible agency with limited discretionary authority, or a reviewing agency providing comment on the air quality impacts of a proposed project or plan. CEQA requires that lead agencies identify significant environmental impacts and to avoid or mitigate those impacts if feasible. Lead agencies in the Sacramento Federal Nonattainment Area (SFNA) often look to the Sac Metro Air District for guidance on CEQA-related topics. In addition, the Sac Metro Air District partners on regional issues with nearby air districts including the following:

- Yolo-Solano Air Quality Management District;
- Placer County Air Pollution Control District;
- El Dorado County Air Quality Management District; and
- Feather River Air Quality Management District.

Sac Metro Air District staff has developed this guidance with input from the other SFNA air districts since they share air quality issues and use the same growth assumptions, mobile source emissions, and modeling efforts to support ozone and PM attainment plans. The geographic area covered by the Sac Metro Air District and the four other neighboring Air Districts listed above is referred to as the Five-Air-District Region.

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This guidance is intended for use in the Sac Metro Air District, however it contains information that can be used by the partner agencies to set guidance.

This guidance document:

1. Replaces the Interim Recommendation.
2. Provides insight on the health effects that may result from a project emitting at the maximum thresholds of significance (TOS) levels in the Five-Air-District Region for oxides of nitrogen (NO_X), volatile organic compounds (VOCs), and PM, in addition to levels of CO and oxides of sulfur (SO_X) calculated proportional to NO_X (as described in **Section 4.1**). This information can be used in environmental documents to provide a conservative estimate of the health effects of criteria pollutant emissions at the significance thresholds or below.
3. Provides look-up tables for estimating health effects for strategic areas where growth exceeding thresholds of significance is anticipated.
4. Provides modeling guidance for CEQA projects that have emissions in excess of the significance thresholds and are located outside the strategic areas modeled.
5. Provides information on disclosing health effects in an overall health context in a CEQA document.

3. ORGANIZATION OF GUIDANCE

This guidance document provides an overview of the Friant Ranch screening analyses, methods and results. **Section 4** describes the screening analysis approach and methods for projects with emissions at or below the thresholds of significance. **Section 5** describes the screening methods for projects located in strategic areas with emissions above the thresholds of significance. **Section 6** provides a general description of the recommended analysis methods for projects above the thresholds of significance suitable for planners and the public should the screening methods in **Section 4** and **Section 5** not be applicable. **Section 7** provides information on incorporating health effects information into a CEQA document and discussing overall health context. **Appendix A** provides, for practitioners skilled in the art of photochemical grid modeling and health effects analyses, recommended procedures for conducting a health effects analysis that would be expected for larger projects and for projects that do not fit the requirements described for using the screening analyses. The procedures used in conducting the health effects screening analysis for small projects are discussed in **Appendix B**. **Appendix C** discusses the screening analysis for strategic area projects. The treatment of SO_2 and CO emissions that do not have significant emissions levels in the screening analysis and procedures for speciating ROG and PM emissions is discussed in **Appendix D**. **Appendix E** provides a list of commonly used Source Classification Codes (SCC) for source types from typical CEQA projects. **Appendices F and G** provide health effects output for the minor project and strategic area project screening modeling.

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4. GUIDANCE FOR SCREENING HEALTH EFFECTS ANALYSIS

4.1 Thresholds of Significance

The Sac Metro Air District and neighboring air districts have established thresholds of significance (TOS) for certain criteria air pollutants and their precursors. If a proposed project has an emissions rate for a pollutant that exceeds one of the TOS, then the project would be considered to have a significant air quality impact and the proponent must evaluate and implement mitigation where feasible. **Table 1** displays the TOS for the Sac Metro Air District and neighboring air districts.

Table 1. Operational thresholds of significance for the Sac Metro Air District and neighboring air districts

Pollutants in lbs./day				
Air District	**NO_X**	**ROG**	**PM_{10}**	**$PM_{2.5}$**
Sacramento	65	65	80	**82**
Placer	55	55	**82**	Not established
El Dorado	**82**	**82**	Cause or contribute to an exceedance of Ambient Air Quality Standards (AAQS)	Cause or contribute to an exceedance of AAQS
Feather River	25	25	80	Not established
Yolo Solano	55[a]	55[a]	80	Not established

[a] 55 lbs./day is equivalent to the 10 tons/year adopted threshold.
Red indicates the highest emission rate among the five districts

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Ramboll conducted a screening analysis to estimate the level of health effects for a proposed CEQA project that has emissions at the maximum TOS levels. In addition to the pollutants with thresholds, project emissions also included SO_2 and CO. SO_2 is a precursor to secondary $PM_{2.5}$ and CO plays a small role in the formation of ozone.

Lead agencies and CEQA practitioners can use this screening analysis to provide a conservative estimate of health effects for projects with emissions at the TOS or below.

4.2 Overview of Health Effects Analysis

This section presents a general overview of the procedures for conducting a health effects analysis of a project that satisfies the requirements of the Friant Ranch court decision to disclose adverse health effects resulting from a CEQA project. The first step in the process is to run a photochemical grid model (PGM) to assess the increases in ambient air concentrations of pollutants that the project emissions may cause. PGMs require a database of information, including meteorology and the spatial and temporal allocation of emissions in the area to be modeled. This includes both existing emissions and the emissions of the particular project being evaluated. The next step is to put the increases in concentrations from the PGM that result from the project's emissions into the Benefits Mapping and Analysis Program (BenMAP), a U.S. Environmental Protection Agency (USEPA) tool that estimates

health impacts from ozone and $PM_{2.5}$. More discussion of the procedures to conduct a health effects analysis are provided in **Section 6** of this guidance, with technical details provided in **Appendix A**.

4.3 Screening Analysis for Projects at or Below Thresholds Levels

A health effects screening analysis was conducted for hypothetical sources within the Sac Metro Air District and neighboring air districts (i.e., the Five-Air-District Region) using emission rates at the thresholds of significance (noted in **Table 1**). The hypothetical source locations were intended to be proxy locations for where real projects may be located.

4.3.1 Definition of Hypothetical Project Sources for Screening Analysis

Each hypothetical source was assumed to have an emission rate for each pollutant at the threshold of significance, indicated by the red numbers in **Table 1**. This resulted in an emission rate of 82 lbs./day for NO_X, ROG, $PM_{2.5}$ and PM_{10}. The hypothetical sources also included emission rates of CO and SO_2 that were based on an analysis of the ratios of the emission rates of SO_2 to NO_X and CO to NO_X for six recent CEQA projects in Sacramento County. This analysis is described in **Appendix D**.

Figure 1 shows the geographic areas in which the Sac Metro Air District expects CEQA projects to be located in Sacramento and neighboring counties (shaded blue), along with the locations of the 41 hypothetical projects. These expected growth areas are consistent with the Sacramento Area Council of Government's 2050 Blueprint growth map. The 41 hypothetical projects were distributed across the potential growth areas to capture the differences in the dispersion regimes of the mountain/valley flow systems, photochemical regimes, areas which include high and low emissions levels, urban and rural atmospheres, and population densities of the urban versus remote areas.

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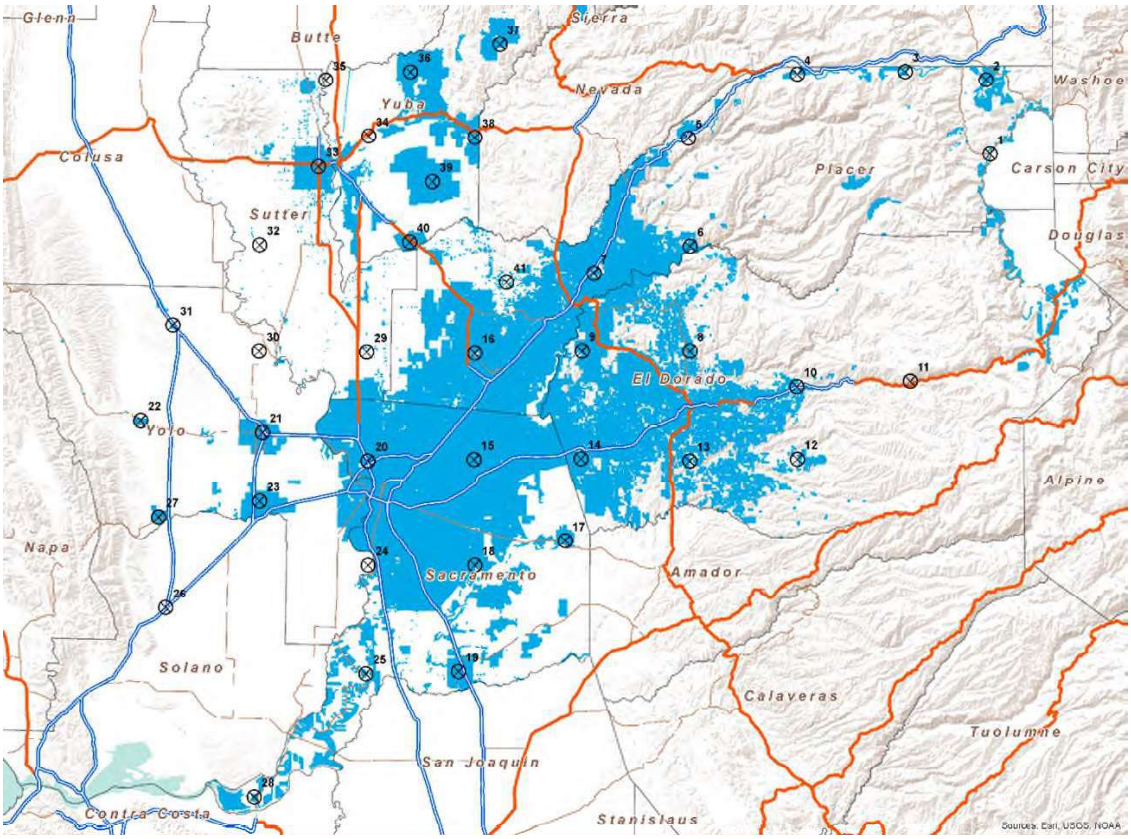
Figure 1. Potential CEQA project locations (blue shading) in the five-air-district region along with locations of the 41 hypothetical project locations used in the screening modeling.



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4.3.2 Screening Analysis Health Effects Modeling

For the screening analysis, the Comprehensive Air Quality Model with Extensions (CAMx) PGM was used with a 2012 annual 4-km grid resolution meteorological and emissions database for a domain covering Sacramento and nearby counties. The 2035 future year anthropogenic (i.e., human-made) emissions were used as the baseline. The ozone and PM impacts were estimated from each of the 41 hypothetical sources whose emissions were set at the 82 lbs./day TOS level for ROG, $PM_{2.5}$ and NO_X and corresponding levels of CO and SO_2. Health effects were estimated for each of the 41 hypothetical sources using a simulator of USEPA's BenMAP health effects model with the concentration-response (C-R) functions, 2035 population, and procedures described in **Appendix A** (see **Tables A-1** and **A-2**). This guidance recommends assessing mortality (all causes), hospital admissions (respiratory, asthma, cardiovascular), emergency room visits (asthma), and acute myocardial infarction (non-fatal) health effects for $PM_{2.5,}$ and assessing mortality, emergency room visits (respiratory) and hospital admissions (respiratory) health effects for ozone, consistent with

the USEPA's approach when establishing the National Ambient Air Quality Standards (NAAQS)[1].

As an example, **Table 2** displays the health effects for PM and ozone increases resulting from hypothetical source location number 20 (see **Figure 1** for location map). The analysis estimates that a project at hypothetical source location number 20, emitting 82 lbs./day of NO_X, ROG and PM and corresponding levels of CO and SO_2, would have 2.3 premature deaths (mortality, all causes) per year across the modeling domain (see Appendix A, Table A-1 and Appendix B, Figure B-2 for the Reduced Sacramento 4-km Modeling Domain specifications and map) and 2.1 premature deaths per year within the Five-Air-District Region due to its increases in PM concentrations. To put this health effect into context, **Table 2** also includes the increase over the background health incidence rate of each health effect endpoint within the Five-Air-District Region. For hypothetical source location number 20, the 2.1 premature deaths per year within the Five-Air-District Region due to the project's PM impacts would result in a very small (0.005%) increase over the background incidence of premature deaths due to PM concentrations within the Five-Air-District Region, which is 44,766 deaths per year.

The PM and ozone health effects due to emissions from each of the 41 hypothetical source locations are provided in **Appendix F**.

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[1] https://www3.epa.gov/ttn/naaqs/standards/pm/data/PM_RA_FINAL_June_2010.pdf.

Table 2. Health effects for hypothetical project number 20 produced by EPA's BenMAP program (see Appendix F for health effects of all 41 hypothetical projects).

BenMAP					
Run with PopGrid populations - Source 20					
$PM_{2.5}$ Health Endpoint	Age Range*	Incidences Across the Reduced Sacramento 4-km Modeling Domain Resulting from Project Emissions (per year)	Incidences Across the 5-Air-District Region Resulting from Project Emissions (per year)	Percent of Background Health Incidences Across the 5-Air-District Region**	Total Number of Health Incidences Across the 5-Air-District Region (per year)**
		(Mean)	(Mean)		
Emergency Room Visits, Asthma	0 - 99	1.45	1.36	0.0074	18419
Mortality, All Cause	30 - 99	2.29	2.06	0.0046	44766
Hospital Admissions, Asthma	0 - 64	0.097	0.092	0.0050	1846
Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	0.19	0.17	0.00071	24037
Hospital Admissions, All Respiratory	65 - 99	0.34	0.30	0.0015	19644
Acute Myocardial Infarction, Nonfatal	18 - 24	0.00013	0.00012	0.0032	4
Acute Myocardial Infarction, Nonfatal	25 - 44	0.012	0.012	0.0038	308
Acute Myocardial Infarction, Nonfatal	45 - 54	0.025	0.024	0.0032	741
Acute Myocardial Infarction, Nonfatal	55 - 64	0.040	0.038	0.0031	1239
Acute Myocardial Infarction, Nonfatal	65 - 99	0.12	0.11	0.0022	5052

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Ozone Health Endpoint	Age Range*	Incidences Across the Reduced Sacramento 4-km Modeling Domain Resulting from Project Emissions (per year) (Mean)	Incidences Across the 5-Air-District Region Resulting from Project Emissions (per year) (Mean)	Percent of Background Health Incidences Across the 5-Air-District Region**	Total Number of Health Incidences Across the 5-Air- District Region (per year)**
Hospital Admissions, All Respiratory	65 - 99	0.085	0.065	0.00033	19644
Mortality, Non-Accidental	0 - 99	0.053	0.043	0.00014	30386
Emergency Room Visits, Asthma	0 - 17	0.46	0.39	0.0066	5859
Emergency Room Visits, Asthma	18 - 99	0.72	0.61	0.0049	12560

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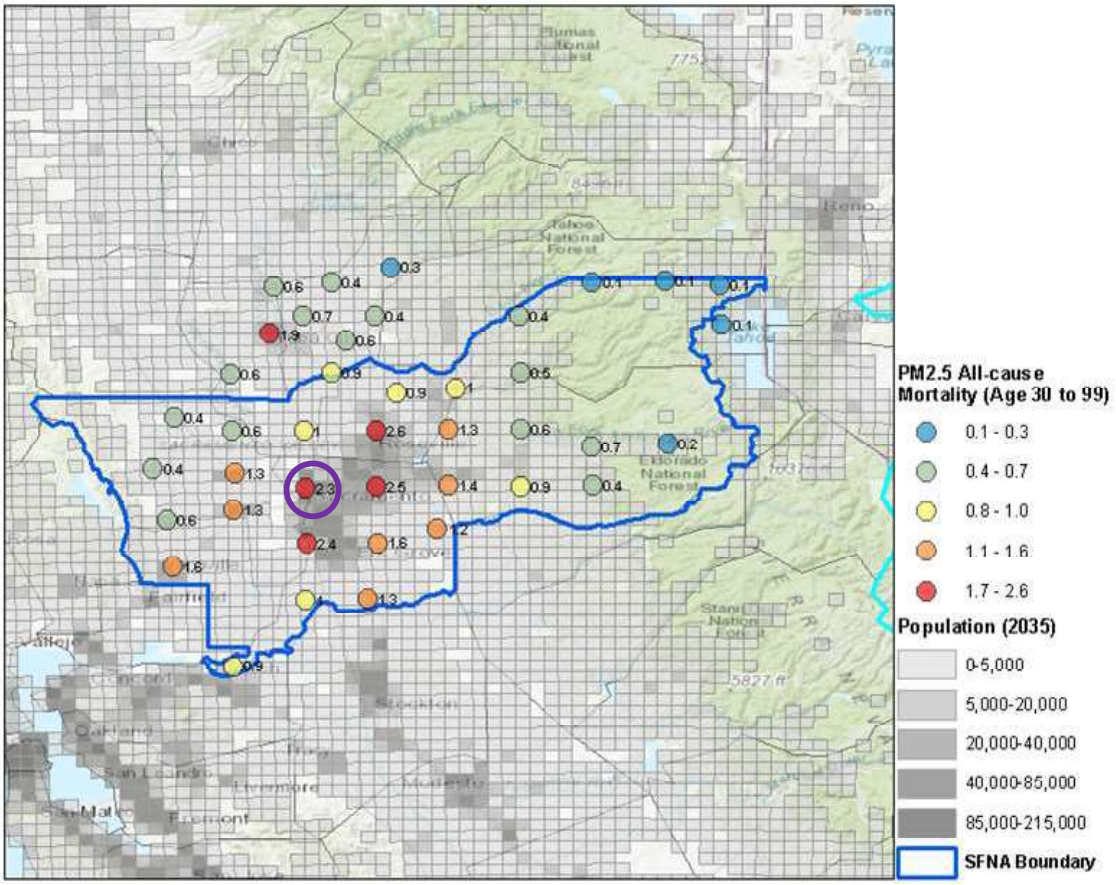
* Other age ranges are available, but the studies shown here are the ones used by the EPA in its health assessments. The age ranges are consistent with each epidemiological study that is the basis of the health function.

** The percent of background health incidence uses the mean incidence. The background health incidence is an estimate of the average number of people that are affected by the health endpoint in a given population over a given period of time. In this case, these background incidence rates cover the Five-Air-District Region. Health incidence rates and other health data are typically collected by the government as well as by the World Health Organization. The background incidence rates used here are obtained from BenMAP.

Figure 2 is a map that displays the estimated number of premature deaths across the modeling domain that may result from increases in PM concentrations from the NO_X, $PM_{2.5}$ and SO_2 emissions at each of the 41 hypothetical project locations. The estimated PM premature deaths range from 0.1 to 2.6. Also shown in **Figure 2** are the gridded population amounts in 2035 used in the health effect estimates. Premature death and other health effects are greatest for those sources located near high population areas. For example, there are three hypothetical sources in Sacramento County that have estimated PM premature deaths greater than 2, whereas all of the other hypothetical source estimated PM premature deaths are less than 2. The three Sacramento County hypothetical sources include source number 20 in the northwestern portion of Sacramento County (near Interstate 5 and Interstate 80), used for the example results shown in **Table 2**.

For a project with emissions below the thresholds of significance, the health effects will be lower than presented here.

Figure 2. Premature deaths resulting from PM at 41 hypothetical project locations on a population base map with SFNA boundary outline. Location of hypothetical source number 20, whose results were presented in Table 2, is shown by the purple circle.



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4.3.3 Minor Project Health Effects Screening Tool

The health effects of the 41 hypothetical sources were interpolated to the 4-km modeling domain and imported into an interactive spreadsheet into which the user can input the project location and obtain the estimated health effects information for a source with TOS emission rates at that location. Projects with emissions lower than the TOS would have lower estimated health effects.

The Minor Project Health Effects Screening Tool is available on the Sac Metro Air District's CEQA Guidance & Tools website.

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5. TREATMENT OF PROJECTS THAT EXCEED THRESHOLDS IN STRATEGIC AREAS

To estimate the health effects of potential projects with emissions greater than the thresholds of significance emission rates and located in strategic areas, additional health effects screening modeling was conducted, and the results were used to develop a Strategic Area Health Effects Screening Tool. This screening analysis is discussed briefly below, with details provided in **Appendix C**.

5.1 Strategic Area Project Screening Modeling

The Sac Metro Air District provided six potential strategic area project locations for use in the health effects screening modeling. These six locations are intended to be used as proxy locations for nearby projects exceeding the thresholds of significance. The six locations are listed in **Table 3** and shown in **Figure 3**.

Table 3. Coordinates for 6 hypothetical strategic area projects.

ID	Name	Latitude	Longitude	Location
I	West Roseville	38.765833	-121.359299	Fiddyment Road & Pleasant Grove Boulevard
II	Rancho Cordova	38.588080	-121.286765	Zinfandel Drive & White Rock Road
III	Downtown Sacramento	38.579336	-121.494119	10th Street & K Street
IV	South Sacramento	38.490489	-121.468468	Florin Road & Franklin Boulevard
V	Woodland	38.677388	-121.765759	Main Street & East Street
VI	Vacaville	38.347954	-121.998058	Merchant Street & Lincoln Highway

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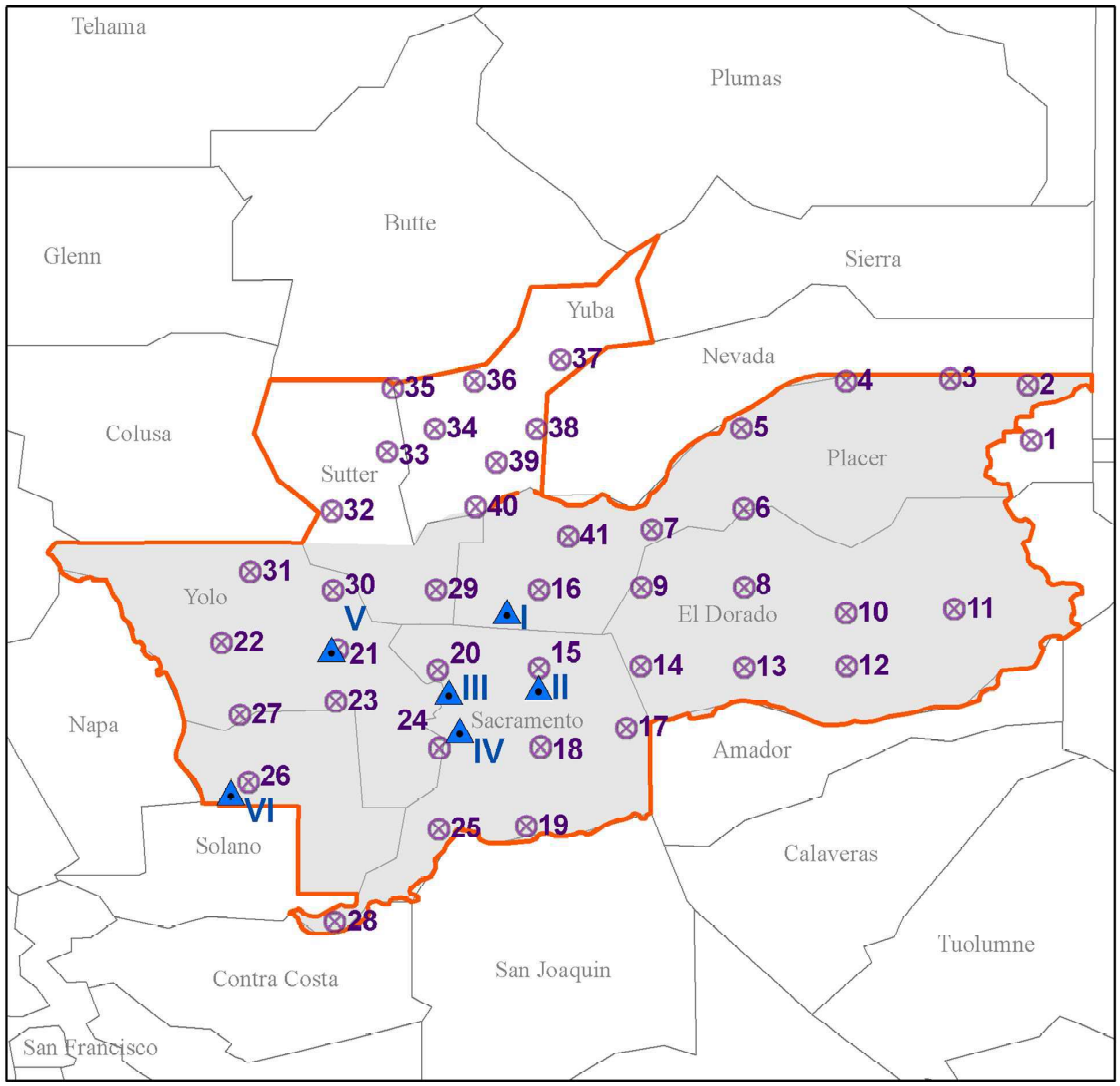
IMPORTANT NOTE: Prior to using the Strategic Area Project Health Screening Tool, project proponents should confirm with Sac Metro Air District staff that one of the strategic area project locations is appropriate for use as a proxy. If a project is located outside of Sacramento County, the project proponent should check with the applicable air district.

Figure 3. Locations of six strategic area Projects I-VI used in the screening modeling, along with the 41 hypothetical projects used in the minor project analysis with boundary of the Five-Air-District Region (red) and the SFNA shaded grey.



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The screening modeling addressed hypothetical sources at each of the six strategic area project locations at emission levels that were two times (2x) and 8 times (8x) the maximum threshold of significance level (see **Table 1**). The strategic area projects also included CO and SO_2 emissions and speciated ROG and PM emissions using the same approach as used in the 41 hypothetical minor project analysis (see **Appendix D**). The strategic area project screening modeling emissions rates used are shown in **Table 4**.

Table 4. Levels of emissions proposed for evaluating strategic area projects that are 2 and 8 times the maximum threshold of significance

Pollutant	Emissions (lbs./day)	
	2xTOS	8xTOS
NO_X	164	656
$PM_{2.5}$	164	656
ROG	164	656
SO_2	1.96	7.84
CO	524	2096

Two annual CAMx ozone and PM source apportionment model simulations were conducted for the 2012 calendar year; 2035 future year anthropogenic (i.e., human-made) emissions were used as the baseline emissions. The following future-year anthropogenic emissions were used: (1) six projects at 2xTOS emissions; and (2) six projects at 8xTOS emissions. Emissions from each of the six projects were tagged for treatment by the CAMx ozone and PM source apportionment tool. The incremental ozone and $PM_{2.5}$ contributions of each of the six projects at the two levels of emissions were used with the BenMAP tool to estimate health effects, with results shown in **Appendix G**. BenMAP was run to obtain ozone and $PM_{2.5}$ health effects from each of the precursor emissions (i.e., NO_X, ROG and PM) separately, which allows the user to obtain only the health results associated with the pollutant with emissions above the threshold.

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5.2 Strategic Area Project Health Effects Screening Tool

The strategic area project screening modeling health effects were used to develop a Strategic Area Projects Health Effects Screening Tool spreadsheet that can be used to estimate health effects for potential projects with emissions below the 8xTOS level. The Strategic Area Project Health Effects Screening Tool has two interactive components that need to be specified by the user:

1. Project Location: The user selects one of the six strategic area project locations (see **Table 3** and **Figure 3**) from a dropdown menu so that the spreadsheet uses the strategic area project health effects screening modeling results for that location.
2. Project Emissions: The user inputs the NO_X, ROG and $PM_{2.5}$ emissions in pounds/day for the potential project. The tool linearly interpolates the ozone and PM health effects for the selected project location from the 2xTOS and 8xTOS CAMx/BenMAP modeling.

If the user inputs any one of the NO_X, ROG or PM emissions below the 2xTOS emissions rate, then the health effects for the 2xTOS emissions level for that precursor is used to provide a conservative estimate of health effects. If the user inputs one or more emission rates above the 8xTOS level, the tool outputs an error message that one or more of the emission rates provided is too high to use the tool.

The Strategic Area Project Health Effects Screening Tool can be obtained on the Sac Metro Air District's CEQA Guidance & Tools website.

5.3 Recommendations for Using the Strategic Area Projects Health Effects Screening Tool

The Strategic Area Health Effects Screening Tool can provide an estimate of the health effects for a CEQA project within the Sac Metro Air District and the 5-Air-District Region with 656 lbs/day or less of NOx, ROG and $PM_{2.5}$ emissions. If the proposed CEQA project is within close proximity (e.g., within one 4-km grid cell) of one of the six strategic area source locations, a project proponent can discuss using the health effects from the Tool at that strategic area location with concurrence from the Sac Metro Air District, or applicable air district if the project is located outside of Sacramento County. If the project is located within the Sac Metro Air District, but is not in close proximity to one of the six strategic area source locations, then the project proponent may use the health effects results from the South Sacramento strategic area location as that will provide a conservative (i.e., upper bound) estimate of the potential health effects of the project, since the South Sacramento strategic area is located in the highest population area in the 5-Air-District Region. If a project is located outside of Sacramento County, the project proponent should confirm this approach with the applicable air district. Alternatively, the project proponent can conduct explicit photochemical grid and health effects modeling following the procedures in section 6 and Appendix A of this guidance.

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6. ANALYSIS OF INDIVIDUAL PROJECTS

For a practitioner skilled in the art of photochemical grid modeling and health effects analysis, **Appendix A** provides detailed guidance on how to conduct a health effects analysis for an individual project in Sacramento County, and potentially in the Five-Air-District Region, with input from the applicable air district**.** This section provides a layperson's description of this approach. While the approach outlined in this section can be used for any project, this guidance document allows a screening approach for projects within Sacramento County and the Five-Air-District Region in which emissions of VOC, NO_X and PM are equal to the maximum thresholds of significance or lower, and provides look-up tables for larger projects in designated strategic areas. Therefore, this individual project modeling guidance should only be used for larger projects outside the designated strategic areas to prepare a site-specific health effects analysis.

In order to estimate the health effects of the increases of criteria pollutants from a proposed project, practitioners should apply a photochemical grid model (PGM) to estimate the increases in concentrations of ozone and $PM_{2.5}$ in the region as a result of the emissions of criteria and precursor pollutants from a project. Next, apply the U.S. Environmental Protection Agency (USEPA)-authored program, the Benefits Mapping and Analysis Program (BenMAP[2]), to estimate the resulting health effects from the increases in concentration. This process is described further below.

6.1 Pollutants Evaluated

This analysis estimates the health effects of criteria pollutants and their precursors, specifically those health effects that are evaluated by the USEPA in rulemaking setting the NAAQS: NO_X, VOC [also known as reactive organic gases, or ROG, which are virtually the same as VOC with some slight differences][3], CO, ozone, SO_2, $PM_{2.5}$ and PM_{10}. USEPA's default health effects functions in BenMAP for PM use $PM_{2.5}$ as the causal PM agent, so the health effects of PM_{10} are represented using $PM_{2.5}$ as a surrogate. NO_X and VOC are not criteria air pollutants but, in the presence of sunlight, they form ozone and contribute to the formation of secondary $PM_{2.5}$ and thus are analyzed here. As a conservative measure, SO_2 and CO are evaluated due to their small contribution to the formation of secondary $PM_{2.5}$ and ozone, respectively.

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This guidance recommends that the health effects from ozone and $PM_{2.5}$ be evaluated, because the USEPA has determined that these criteria pollutants would have the greatest effect on human health. While ozone is not commonly emitted directly, some $PM_{2.5}$ is emitted directly. Ozone and secondary $PM_{2.5}$ are formed by the emissions of other pollutants to the atmosphere, including VOC, NO_X, CO and SO_2.

Additionally, SO_2, NO_2 and CO concentration changes due to a project are not evaluated individually. Each of these pollutants has NAAQS against which the presence or absence of health effects can be measured, and none of these pollutants are typically considered to be formed in the atmosphere as secondary pollutants, as are ozone and $PM_{2.5}$. NAAQS are health-based thresholds and thus a direct comparison with them allows evaluation of

[2] https://www.epa.gov/benmap/benmap-ce-manual-and-appendices.

[3] ROG emissions are quantified and modeled as VOCs in this assessment. ROG means total organic gases minus ARB's "exempt" compounds (e.g., methane, ethane, CFCs, etc.). ROG is similar, but not identical, to USEPA's term "VOC", which is based on USEPA's exempt list, which is slightly different from ARB's list.

potential health effects. NO_2 concentration changes are not individually evaluated as there are currently no NO_2 non-attainment areas in the United States, even now that the 1-hour standard has been implemented. Similarly, SO_2 concentration changes are also not individually evaluated as there are no current SO_2 non-attainment areas in the state of California. Sac Metro Air District has been in attainment of the NAAQS and State CO standards since the early 1990s. Even so, as noted above, contributions of NO_X, CO, and SO_2 continue to be evaluated for their contributions to the formation of ozone and secondary $PM_{2.5}$, the two criteria pollutants the USEPA has determined to have the greatest effect on human health.

6.2 Technical Analysis

The first step in the technical analysis is to run the PGM with appropriate information to assess the increases in ambient air concentrations of pollutants that the project's emissions may cause. PGMs require a database of information, including meteorological fields and how emissions are distributed in the area to be modeled. This includes both existing emissions and project emissions. The latest publicly-available PGM database for Northern California should be used in this analysis.

The USEPA's air quality modeling guidelines (Appendix W[4]) and ozone and $PM_{2.5}$ modeling guidance[5] recommend using a PGM to estimate ozone and secondary $PM_{2.5}$ concentrations. The USEPA's modeling guidance does not recommend specific PGMs but provides procedures for determining an appropriate PGM on a case-by-case basis. Both the modeling guidelines and guidance note that the CAMx[6] and the Community Multiscale Air Quality (CMAQ)[7] PGMs have been used extensively in the past and would be acceptable PGMs. The USEPA has prepared a memorandum[8] documenting the suitability of using CAMx and CMAQ for ozone and secondary $PM_{2.5}$ modeling of a single-source or small group of sources. 43 CONT

To estimate the potential outcome of a proposed project's emissions on ambient pollutant concentrations, add the project's mitigated emissions to the existing emissions in the PGM database. Ensure that the project emissions that are analyzed present a maximum year. Construction emissions could be included in the analysis if the lead agency determines the size, intensity, and duration of construction warrant review and disclosure. These maxima may occur in different years but may be conservatively analyzed in a single-year assessment. Consider when the maximum emissions year will have the greatest impact. It is recommended that maximum 24-hour emission rates be used, as some of the C-R health effects functions use daily concentration estimates. Account for seasonal changes in maximum 24-hour emissions when appropriate, such as when wood stoves or fireplaces are used for home heating in the cold months.

Each project's emissions should be spatially distributed across the modeling area in a manner that reflects the actual distribution, considering where mobile source emissions may occur. Operational emissions may include area sources (architectural coatings, VOCs in

[4] https://www3.epa.gov/ttn/scram/appendix_w/2016/AppendixW_2017.pdf.

[5] https://www3.epa.gov/ttn/scram/guidance/guide/O3-PM-RH-Modeling_Guidance-2018.pdf.

[6] http://www.camx.com/.

[7] https://www.epa.gov/cmaq.

[8] https://www3.epa.gov/ttn/scram/guidance/clarification/20170804-Photochemical_Grid_Model_Clarification_Memo.pdf.

consumer products, and landscaping equipment), emergency generators, off-road equipment, and emissions associated with motor vehicle use. Construction emissions may include off-road equipment, paving, architectural coatings, fugitive dust, and emissions associated with hauling, vendor, and worker activity.

Following completion of the PGM modeling, use USEPA's BenMAP[9, 10] program to estimate the potential health effects of the project's contribution to ozone and $PM_{2.5}$ concentrations. BenMAP uses the concentration estimates produced by the PGM along with population and health effect C-R functions to estimate various health effects of the concentration increases. BenMAP has a wide history of applications by the USEPA and others, including for local-scale analyses[11] as needed to assess the health effects of a project's emissions. Use the USEPA default BenMAP health effects C-R functions that are typically used in national rulemaking, such as the health effects assessment[12] for the 2012 $PM_{2.5}$ NAAQS. The guidance recommends assessing the following health effects for $PM_{2.5}$: mortality (all causes), hospital admissions (respiratory, asthma, cardiovascular), emergency room visits (asthma), and acute myocardial infarction (non-fatal). For ozone, the guidance recommends the following endpoints: mortality, emergency room visits (respiratory) and hospital admissions (respiratory).

The procedures outlined in **Appendix A** are designed to provide guidance to a practitioner with experience in PGM modeling to conduct a health effects analysis that satisfies the requirements of the Friant Ranch court decision. Consequently, the guidance assumes a level of knowledge of PGM and health effects modeling and is not designed for those not familiar with PGM and health effects modeling.

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[9] https://www.epa.gov/benmap/how-benmap-ce-estimates-health-and-economic-effects-air-pollution.

[10] https://www.epa.gov/sites/production/files/2015-04/documents/benmap-ce_user_manual_march_2015.pdf.

[11] https://www.epa.gov/benmap/benmap-ce-applications-articles-and-presentations#local.

[12] https://www3.epa.gov/ttn/naaqs/standards/pm/data/PM_RA_FINAL_June_2010.pdf.

7. DISCLOSING MODELING RESULTS IN A PROJECT CEQA DOCUMENT

Now that photochemical grid modeling and BenMAP analyses have been conducted for minor projects at the maximum threshold levels at 41 locations in the five-air-district area, and for projects greater than threshold levels (2x and 8x) for 5 strategic growth areas, an analysis of the results must be developed for disclosure in a project CEQA document. Only the health effects of ozone and $PM_{2.5}$ are addressed in this guidance, as those are the pollutants that USEPA uses in BenMAP to estimate the health effects of emissions of NOx, VOCs, CO, SO_2, and $PM_{2.5}$. Ozone and $PM_{2.5}$ have the most critical health effects and thus are the emissions evaluated to determine the CEQA project's health effects. A CEQA analysis should report the results generated by the Minor Project Health Effects Screening Tool, Strategic Area Project Health Effects Screening Tool (example output in **Table 2**), or project specific modeling, and qualitatively discuss how the health effects tool provides an average estimate across all populations. Note that CEQA "does not require technical perfection in an EIR, but rather adequacy, completeness, and a good-faith effort at full disclosure."[13] To this end, the environmental document will be improved in its sufficiency as an informational document if it includes a *qualitative* discussion of influences on the outcomes of modeling the health effects of projects. These factors may apply *universally* to the health effects on the total population or be *limited in application* to population subgroups.

7.1 Discussing Health Effects on the Total Population

Present the applicable screening table for the project and **frame the model's outputs in terms of the wider context of current population health**. Provide this wider context for the results by describing overall health conditions in the county. This can be done by using other data sources, which might include:

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- Be Healthy Sacramento[14], which provides a search of and comparisons of local health indicators.
- The California Department of Public Health, which provides County Health Status Profiles.[15]
- The California Air Resources Board's lists of health tracking websites, which provide community health trends.[16]

As an example of how to use this data, Sacramento County's Health Status Profile for 2019 reported an annual average of 11,551 deaths from all causes (2015-2017) in Sacramento County. This can be compared to a project with emissions at or below the thresholds of significance for which the screening tool indicates that the potential increase in mortality incidence is less than 3 in the Five-Air-District Region.

[13] *2020 CEQA Statute & Guidelines Handbook* https://www.califaep.org/statute_and_guidelines.php, Association of Environmental Professionals, CEQA Guidelines Section 15003, Policy (i), p. 136. Accessed 4/28/20

[14] *Be Healthy Sacramento,* Sacramento County, 2020, www.behealthysacramento.org. Accessed 3/9/2020

[15] *Vital Records Data and Statistics*, California Department of Public Health, 2020, https://www.cdph.ca.gov/Programs/CHSI/Pages/County-Health-Status-Profiles.aspx. Accessed 3/9/2020

[16] *Understanding the Health of Our Communities,* California Air Resources Board, 2020, https://ww2.arb.ca.gov/resources/documents/understanding-health-our-communities. Accessed 3/13/2020

Also consider that overall, **each model generates *conservative* estimates of health effects**, for two reasons:

- **The tools' outputs are based on the simulation of a *full year* of exposure at the maximum daily average** of the increases in air pollution concentrations. As a result, actual project-related health effects may be *less* than the estimates calculated by the tool. For more information on how the CAMx modeling was prepared to estimate ozone and $PM_{2.5}$ emission concentration changes due to a project's emissions, and the resulting conservative nature of the health effects modeling using the BenMAP model, please see Section A.4 of **Appendix A**.
- **The health effects are calculated for emissions levels that are very high.** For the Minor Projects Health Effects Tool, described in Section 4, emissions are assumed to be *at* the threshold of significance levels. The Minor Projects Health Effects Screening Tool estimates the mean incidence of health outcomes such as mortality, hospital admissions, emergency room visits and heart attacks (acute myocardial infarction) in the Five-Air-District Region that may result from emissions from a new project that emits 82 pounds/day of NOx, ROG or PM. For the Strategic Area Project Health Effects Tool, described in Section 5, inputted emissions are between *two times* and *eight times* the threshold of significance (up to 656 pounds/day). The Strategic Area Project Health Effects Screening Tool focuses the analysis in six locations where growth is expected from projects with emissions above thresholds levels. Most projects, except for large plans such as specific plans, will not have emissions at these high levels.

However, even with these conservative factors built in, the models' outputs indicate low overall health effects. The mean health incidence for a project emitting at the threshold of significance levels at all 41 locations was less than 3 per year for mortality and less than 1.5 per year for other health outcomes evaluated. The modeling results support a conclusion that any one proposed project in the Five-Air-District Region with emissions at or below the maximum threshold levels does not on its own lead to sizeable health effects. At the strategic area locations, as expected, mean health incidences are higher than the Minor Projects Health Effects Screening Tool. The maximum reported mortality rate is 22 incidences per year and all other health outcomes evaluated are under 9 per year from a project emitting 656 pounds/day of NOx, ROG, and PM at the downtown Sacramento location.

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On the other hand, projects may produce other health effects that are not evaluated in the models. These can be discussed as well.

- **The models' outputs include only the effects that have been researched sufficiently so as to be quantifiable.** Research has identified other health effects for both $PM_{2.5}$ and ozone than those indicated in the models.
  - For $PM_{2.5}$, modeled health outcomes include respiratory effects, cardiovascular effects, and premature mortality. But $PM_{2.5}$ through various modes of action can alter not only respiratory and cardiovascular systems, but also metabolism, affecting weight gain and increasing diabetes rates; the nervous system, leading to cognitive decline, brain inflammation, and reduced brain volume; and gestation, resulting in

low birthweight and preterm birth.[17] These other effects have been documented but not been studied sufficiently to identify a dose-response relationship.

- For ozone, the health consequences reported by these models include respiratory effects and premature mortality. In the screening models, project health effects resulting from ozone are considerably smaller than those of $PM_{2.5}$. Ozone is primarily a respiratory system irritant, but at sufficient doses, ozone can increase lung permeability, increasing their susceptibility to toxins and microorganisms.[18] Long-term exposure to ozone may cause permanent lung damage, such as abnormal lung development in children, and has also been linked to cardiovascular effects, but less is known than for $PM_{2.5}$ about the concentrations at which these effects occur.[19]

7.2 Discussing Health Effects in Population Subgroups

The models estimate increases in the incidence of health effects in the entire population of the Five-Air-District Region. The model outputs are derived from the numbers of people who would be affected by a project due to their geographic proximity and based on an *average population* throughout the Five-Air-District Region. **The models do not take into account population subgroups with greater vulnerabilities to air pollution, except for ages for certain endpoints.** The health effects of increased air pollution emissions may occur disproportionately in areas where the population is more susceptible to health effects from air pollution.

The Centers for Disease Control and Prevention (CDC)[20] reports human health being influenced by five main determinants: genetics, behavior, environmental and physical influences, medical care, and social factors. These five determinants of health are seen in **Figure 4**. BenMAP estimates the potential health effects from a change in air pollution concentrations, but does not fully account for other factors impacting health such as access to medical care, genetics, income levels, behavioral choices such as diet and exercise, and underlying health conditions. As an environmental factor, air pollutants have been linked to multiple health effects, with greater impacts on vulnerable populations.[21] Vulnerable populations are those defined by environmental sensitivity factors such as age, race/ethnicity, levels of education and income, and linguistic isolation.[22]

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[17] *Particulate Matter: Spotlight on Health Protection. Symposium Summary: Health Effects and Exposures and Risk. October 29, 2019*. Bay Area Air Quality Management District. https://www.baaqmd.gov/~/media/files/board-of-directors/advisory-council/2019/20191028-pm-symposium-summary-final-03062020-pdf.pdf?la=en. Accessed 4/28/20.

[18] *Facts About Ozone and Health,* California Air Resources Board, 2016, https://ww3.arb.ca.gov/research/aaqs/caaqs/ozone/ozone-fs.pdf Accessed 4/17/20

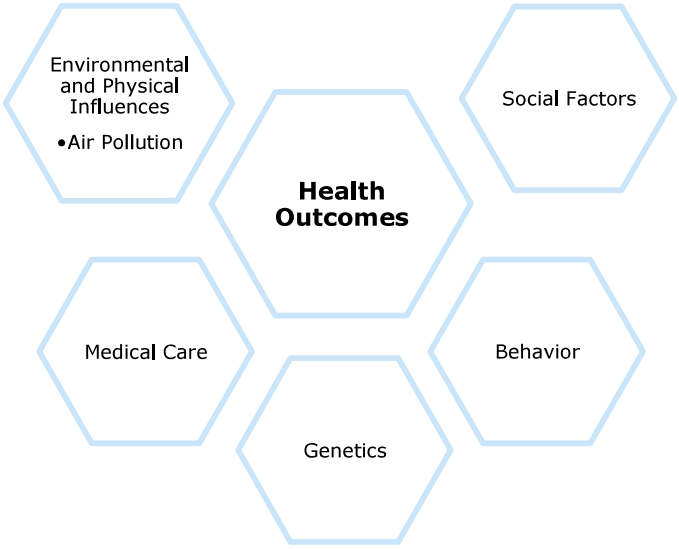
[19] *Ozone and Oxidants,* Health Effects Institute, https://www.healtheffects.org/air-pollution/ozone-and-oxidants, 2020. Accessed 4/9/2020

[20] *NCHHSTP Social Determinants of Health*, U.S. Centers for Disease Control and Prevention, 2019, https://www.cdc.gov/nchhstp/socialdeterminants/faq.html#what-are-social-determinants . Accessed 4/13/2020

[21] *People at Risk,* California Air Resources Board, 2020, https://ww2.arb.ca.gov/our-work/programs/people-risk/about. Accessed 4/14/2020

[22] *Climate Change and Health Vulnerability Indicators for California,* California Department of Public Health, April 2020. https://www.cdph.ca.gov/Programs/OHE/Pages/CC-Health-Vulnerability-Indicators.aspx. Accessed 4/29/20

Figure 4. Five main determinants that affect human health (Source: CDC).



The CDC has made it a priority nationally to achieve health equity, eliminate disparities, and improve the health of all groups.[23] One of the health disparities observable in the effects of air pollution is that increases in $PM_{2.5}$ and ozone concentrations lead to a *greater risk of death for racial minorities and people with low income* than for the rest of the population, even when the concentrations are lower than the national standards.[24] Communities that are home to high numbers of low-income and minority populations are often *environmental justice* (EJ) areas where a history of unfavorable decisions has led to greater concentrations of air pollution and other negative environmental factors than in higher-income areas. In EJ areas, not only are the residents exposed to higher levels of negative environmental factors, but because of the chronic stressors inherent in a life with limited resources and other factors that increase their susceptibility, they are less resilient to environmental influences on health. As a result, emissions from a new project will be experienced more severely in low-income and minority communities than in wealthier areas. The tool outputs health effects in regional averages. The number of health incidences that result from an increase in air pollution will not likely be higher than what the model estimates, but the incidences may disproportionately occur in the areas where the population is more susceptible.

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It will be especially important to discuss this in the environmental document if a project emits $PM_{2.5}$ in the community. Both ozone and $PM_{2.5}$ contribute to regional health impacts, but ozone is primarily a regional pollutant, and its effects are experienced throughout the

[23] *NCHHSTP Social Determinants of Health*, U.S. Centers for Disease Control and Prevention, 2019, https://www.cdc.gov/nchhstp/socialdeterminants/faq.html#what-are-social-determinants. Accessed 4/13/2020

[24] Quan Di, MS et al: "Air Pollution and Mortality in the Medicare Population," N Engl J Med 2017; 376:2513-2522, June 29, 2017, https://www.nejm.org/doi/full/10.1056/NEJMoa1702747.

community. On the other hand, primary $PM_{2.5}$ emissions are more locally concentrated. For example, the people who experience the most health effects from roadway pollutant emissions are those who live within 1,000 feet of a freeway or major roadway.[25] Projects that emit a great deal of $PM_{2.5}$ are likely to have more impact locally in vulnerable communities than in communities more representative of the average population of the region.

7.3 Identifying Vulnerable Populations

To identify and discuss the population characteristics near a project site that may lead to increased risk of health effects from a project, a useful tool is the Healthy Places Index[26] created by the Public Health Alliance of Southern California and derived from federal, state and local government data. The Healthy Places Index (HPI) offers indicators of local community conditions in California that contribute to life expectancy and a mapping tool for comparisons of selected areas with other areas across the region or the state. The HPI mapping tool can be used to compare *specific characteristics* of the population in the area of the proposed project – such as the proportion of the population living below 200% Federal Poverty Level – with other census tracts, cities, counties, Congressional districts, elementary school districts, or other geographic units in the area. It can also be used to compare the *overall relative health vulnerability* (the combined indicators) with those of other geographic units. The HPI mapping tool allows the user to compare local factors down to the census tract level, a degree of resolution that is useful for assessing project health effects. A geographic area that appears in a shade of blue on the HPI mapping tool has *lower* levels of health-promoting community conditions and could be reported in the CEQA analysis as likely to experience a *disproportionate rate of health effects* from a project than a community that appears in a shade of green. The HPI mapping tool provides *comparisons* only, showing how an area compares to other areas in the state or to other geographic regions selected, and not raw numbers.

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7.4 Consideration of Incidental Health Effects

While this guidance is focused on the health effects of air pollution emitted by a single project, it should be considered that a project may influence health in other ways. New development creates changes in the built environment that can affect health through various pathways. A complete analysis might include a qualitative discussion of how the project's changes to the built environment could have incidental health effects, and whether those incidental health effects will be experienced by *project users* and the *broader community*. The following topics could be considered.

Vehicle Miles Traveled: Increasing vehicle miles traveled per capita (VMT/capita) in a region creates acute health impacts (injuries and deaths due to vehicle collisions) as well as chronic health impacts (obesity, hypertension, diabetes, and heart disease due to increased sedentary behaviors, such as driving).[27] Conversely, reducing VMT/capita by increasing

[25] *Strategies to Reduce Air Pollution Exposure Near High Volume Roadways,* California Air Resources Board, Technical Advisory April 2017. P. 12. https://ww2.arb.ca.gov/sites/default/files/2017-10/rd_technical_advisory_final.pdf. Accessed 4/28/20.

[26] https://healthyplacesindex.org/

[27] *Cutting Greenhouse Gas Emissions is Only the Beginning: A Literature Review of the Co-Benefits of Reducing Vehicle Miles Traveled*, UC Davis National Center for Sustainable Transportation, 2017,

density and land use mix, especially when combined with sidewalks or trails and public transit infrastructure, enables more people to live closer to daily destinations, making it practical to walk and bike instead of drive. This increases physical activity and reduces obesity, diabetes, high blood pressure, heart disease, and other chronic conditions associated with a sedentary lifestyle. Infill development provides support for transit operations, which offer people more options for accessing health-supportive services such as grocery stores, pharmacies, and medical facilities. Building housing near transit encourages people to walk to transit to get to where they need to go, and provides linkages to jobs, food, and health services for the one-third of adults who do not drive. More compact, connected street networks with fewer lanes on major roads are correlated with lower levels of obesity, diabetes, high blood pressure, and heart disease, as well as with the lowest levels of traffic deaths.[28]

Urban Greening: Greater neighborhood tree canopy has been correlated to improvement of overall human health, primarily healthier weight, social cohesion, and mental health.[29] People make more walking trips to task destinations such as stores or coffee shops when they perceive that there are many natural features along the route, including street trees. New trees planted on roadsides and medians and along sidewalks reduce crash rates on both urban arterial and highway sites.[30] Trees and shrubs in thick vegetative barriers along freeway edges can also absorb and disperse traffic emissions and thus reduce exposure to pollutants for nearby populations. Shade trees on streets, in parking lots, and near driveways reduce emissions of volatile organic compounds from parked cars.

Heat Exposure: By the end of the century, average daily temperatures will increase by 10° F in the Sacramento region, with as many as 36 added days of extreme heat (greater than 103.9° F) per year in some areas. Extreme heat can lead to heat-related illnesses such as heat rash, heat exhaustion, and heatstroke. If left untreated, heat-related conditions can lead to death.[31] The built environment can increase or decrease incidence of extreme heat and heat exposure. Projects that convert natural or agricultural lands to areas covered with concrete, asphalt, and rooftops increase the amount of solar radiation that is absorbed and re-radiated into the surrounding environment, creating an urban heat island effect. Projects that increase tree canopy and utilize high-albedo surfaces such as cool roofs and cool pavements can lower local temperatures and contribute to regional reductions. Combining these vegetation and cool-surface measures provides the greatest effect.[32]

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Allostatic Load: Defined as the cost of chronic exposure to elevated or fluctuating stress-hormone or neural responses resulting from chronic or repeated challenges that the

https://ncst.ucdavis.edu/research-product/cutting-greenhouse-gas-emissions-only-beginning-literature-review-co-benefits.

[28] Marshall WE et al (2014) Community design, street networks, and public health. *J Transport and Health* 1 (4), p. 326-340. Dec 2014. https://doi.org/10.1016/j.jth.2014.06.002

[29] Ulmer JM et al. Multiple health benefits of urban tree canopy: The mounting evidence for a green prescription, *Health and Place* 42, 54-62. November 2016. https://doi.org/10.1016/j.healthplace.2016.08.011

[30] Mok, J., et al. (2006) Landscape Improvement Impacts on Roadside Safety in Texas. *Landscape and Urban Planning*, Vol. 78, No. 3, pp 263-274. http://www.naturewithin.info/Roadside/RdsdSftyTexas_L&UP.pdf

[31] Capital Region Climate Readiness Collaborative, *Capital Region Transportation Sector Urban Heat Island Reduction Plan,* May 2020. pp. 9-10. https://urbanheat-smaqmd.hub.arcgis.com/

[32] Capital Region Climate Readiness Collaborative, *Capital Region Transportation Sector Urban Heat Island Reduction Plan Summary Report,* May 2020, p. 16. https://urbanheat-smaqmd.hub.arcgis.com/

individual experiences as stressful, allostatic load can lead to development of heart disease, diabetes, chronic pain, fatigue, and other conditions.[33] The built environment can increase or decrease the allostatic burden placed on individuals. Projects that expose people to chronic noise or odors increase the burden. Allostatic load also increases if people have difficulty fulfilling daily needs. Projects that support individuals of all incomes and ages and that include a mix of uses or amenities to facilitate daily life will reduce the sense of stress in peoples' lives. Infill and compact development projects can increase community connectivity and social cohesion (trust), reducing stress and improving health resilience. Allostatic load is also decreased by projects that provide ample access to safe physical activity, whether through sidewalks and bike lanes that lead to daily destinations or networks of walking and biking trails. Projects that incorporate social cohesion can increase perceived safety, which also reduces stress and encourages use of active modes.

Once the health effects of a project are fully reviewed and described, including disclosure of outputs from one of the screening tools or project-specific modeling results and discussion of health effects in context, the lead agency can make an informed decision on a project with health effects information that meets the intent of the Friant ruling.

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[33] *Allostatic Load,* ScienceDirect, 2020. https://www.sciencedirect.com/topics/neuroscience/allostatic-load

APPENDIX A
GUIDANCE FOR CONDUCTING A SITE-SPECIFIC HEALTH EFFECTS ANALYSIS

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This Appendix provides documentation on how to conduct a site-specific health effects analysis for a project in Sacramento County (and potentially the Five-Air-District Region with input from the applicable air district) that does not qualify to use the minor project screening approach, or the larger project strategic area approach provided in this guidance.

The procedures outlined in this Appendix are designed to provide guidance to practitioners with experience in PGM modeling in conducting health effects analyses that satisfy the requirements of the Friant Ranch court decision. Consequently, this guidance assumes a level of knowledge related to PGM modeling and is not designed for those not familiar with PGM modeling.

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A.1 OVERVIEW OF TECHNICAL APPROACH

The first step in this process is to run a photochemical grid model (PGM) with appropriate information to assess the increases in ambient air concentrations of pollutants caused by the project's emissions. PGMs require a database of information, including meteorological fields and the spatial allocation of emissions in the area to be modeled, including both base (background/existing) emissions and emissions for the project being evaluated. A recommended modeling plan for conducting such a photochemical modeling study is provided in **Section A.2.**

Project emissions include oxides of nitrogen (NO_X), respirable (PM_{10}) and fine ($PM_{2.5}$) primary particulate matter (PM), sulfur dioxide (SO_2), carbon monoxide (CO) and volatile organic compounds (VOC, also called ROG). NO_X and VOC are precursors to ozone and, along with SO_2, are also precursors to secondary $PM_{2.5}$. CO also plays a smaller role in the formation of ozone and should be considered for evaluation if emissions information is available.

To estimate the potential outcome of a proposed project's emissions on ambient air concentrations, a project's emissions are added to the 4-km annual PGM modeling database.[34] For use in PGMs, each project emissions source must be spatially distributed across the modeling grid cells so that they can be incorporated into the gridded emission inventory. For projects with on-road mobile source emissions, the emissions will need to be spread across the roadway network.

Once project emissions are allocated to grid cells, emission estimates from the project are spatially gridded, temporally allocated (e.g., adjustments to account for season/month, day-of-week and hour-of-day), and chemically speciated to be used for the PGM using the Sparse Matrix Operator Kerner Emissions (SMOKE[35]) emissions modeling system supported by the USEPA. More details on how to work with the emissions inventory, spatial allocation, and SMOKE inputs and outputs are described in **Section A.3.**

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In order to be conservative, we recommend that future year emissions be used for the modeling database. Future years will feature larger populations and lower background emissions, which usually results in higher ozone and secondary PM from the incremental project emissions. Accordingly, the future year database provides the most conservative estimate of health effects. More details on preparing inputs for the PGM modeling are included in **Section A.3.**

Following completion of the PGM modeling, the USEPA's BenMAP[36, 37] program is used to estimate the potential health effects of the project's contribution to ozone and $PM_{2.5}$ concentrations. USEPA's default health effect functions in BenMAP for PM use fine particulate ($PM_{2.5}$) as the causal PM agent, so the health effects of PM_{10} are represented using $PM_{2.5}$ as a surrogate. BenMAP uses the concentration

[34] In this guidance we recommend that the currently available BAAQMD 2012 PGM modeling database be used for the CCOS Northern California domain or a reduced size domain that is focused on the SFNA. BAAQMD performed Weather Research and Forecasting (WRF) meteorological modeling for the 4-km domain and 2012 calendar year that has been processed by MCIP and WRFCAMx to generate CMAQ and CAMx 2012 4-km meteorological inputs for the domain. BAAQMD prepared 2012 emissions for the CMAQ model that have been converted to the format used by CAMx using the CMAQ2CAMx processor.

[35] https://www.cmascenter.org/smoke/

[36] https://www.epa.gov/benmap/how-benmap-ce-estimates-health-and-economic-effects-air-pollution.

[37] https://www.epa.gov/sites/production/files/2015-04/documents/benmap-ce_user_manual_march_2015.pdf.

estimates produced by CAMx, along with population and health effect concentration-response (C-R) functions, to estimate the various health effects of the concentration increases. BenMAP has a wide history of applications by the USEPA and others, including for local-scale analysis[38] as needed for assessing the health effects of a project's emissions. This guidance recommends using USEPA-default BenMAP health effects C-R functions that are typically used in national rulemaking, such as the health effects assessment[39] for the 2012 $PM_{2.5}$ NAAQS. The health effects for $PM_{2.5}$ include mortality (all causes), hospital admissions (respiratory, asthma, cardiovascular), emergency room visits (asthma), and acute myocardial infarction (non-fatal). For ozone, the endpoints are mortality, emergency room visits (respiratory) and hospital admissions (respiratory). Details on the BenMAP inputs and outputs and definitions for the health effects are shown in **Section A.4.**

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[38] https://www.epa.gov/benmap/benmap-ce-applications-articles-and-presentations#local.
[39] https://www3.epa.gov/ttn/naaqs/standards/pm/data/PM_RA_FINAL_June_2010.pdf.

A.2 MODELING PLAN

Estimating the potential health impacts of criteria pollutants due to emissions from a proposed CEQA project involves the following activities:

- Selection of an air quality model and air quality modeling database for use in the analysis.
- Estimating the ozone and PM precursor emissions for the proposed CEQA project.
- Processing of the CEQA project emissions for use in the selected air quality model.
- Air quality modeling of the proposed CEQA project emissions to obtain the incremental ozone and PM concentrations due to the project's emissions.
- Processing of the incremental ozone and PM concentrations due to the project's emissions by a health effects model to estimate the mortality, morbidity and other health effects.
- Documenting the health effects modeling and results with enough detail that the results could be duplicated.

A.2.1 Selection of an Air Quality Model

Proposed CEQA project emissions typically include, but are not limited to NO_X, PM_{10}, $PM_{2.5}$, SO_2, CO and VOC. NO_X and VOCs are not criteria air pollutants[40] but, in the presence of sunlight, they form ozone and contribute to the formation of secondary $PM_{2.5}$ and thus are analyzed here. If SO_2 and CO emissions are otherwise quantified in the environmental document, these can be conservatively included as they have contributions to the formation of secondary $PM_{2.5}$ and/or ozone.

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EPA's air quality modeling guidelines (Appendix W[41]) and ozone and $PM_{2.5}$ modeling guidance[42] recommend using a photochemical model to estimate ozone and secondary $PM_{2.5}$ concentrations. Most photochemical models for modeling ozone and secondary PM are photochemical grid models (PGMs). EPA's modeling guidance does not recommend specific PGMs but provides procedures for determining an appropriate PGM on a case-by-case basis. EPA's air quality modeling guidelines and guidance does note that both the Comprehensive Air-quality Model with extensions (CAMx[43]) and the Community Multiscale Air Quality (CMAQ[44]) PGMs have been used extensively in the past and if applied correctly would be acceptable PGMs. In fact, EPA has prepared a Memorandum[45] documenting the suitability of using CAMx and CMAQ for ozone and secondary $PM_{2.5}$ modeling of single-sources or a small groups of sources.

[40] The six criteria air pollutants are ozone (O_3), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO) and lead (Pb).

[41] https://www3.epa.gov/ttn/scram/appendix_w/2016/AppendixW_2017.pdf.

[42] https://www3.epa.gov/ttn/scram/guidance/guide/O3-PM-RH-Modeling_Guidance-2018.pdf.

[43] http://www.camx.com/.

[44] https://www.epa.gov/cmaq.

[45] https://www3.epa.gov/ttn/scram/guidance/clarification/20170804-Photochemical_Grid_Model_Clarification_Memo.pdf.

Thus, for the Sac Metro Air District Friant Ranch analysis of the health effects of criteria pollutants from a proposed CEQA project, either the CAMx or CMAQ PGMs would be acceptable.

A.2.2 Selection of an Air Quality Modeling Platform

Because some of the health effect Concentration-Response (C-R) functions require annual PM concentrations, an annual PGM modeling platform is required. The development of an all-new annual PGM modeling platform from scratch is quite resource-intensive. Thus, it is more cost-effective to use an appropriate existing PGM modeling platform. The California Air Resources Board (ARB) and several air districts in California routinely develop PGM modeling databases to address ozone and $PM_{2.5}$ attainment as part of State Implementation Plans (SIPs). We propose to use the latest publicly-available PGM database for Northern California, developed by the Bay Area Air Quality Management District (BAAQMD), and to adapt it for this analysis. The BAAQMD PGM database is tailored for California using California-specific input tools [e.g., the Emissions Factor (EMFAC[46]) mobile source emissions model] and uses a high-resolution 4-km horizontal grid resolution to better simulate meteorology and air quality in the complex terrain and coastal environment of California. This contrasts with EPA's national modeling platforms[47] used for national rulemakings [e.g., transport rules such as Cross-State Air Pollution Rule (CSAPR[48]) or defining new NAAQS] that use a coarser 12-km horizontal grid resolution. The BAAQMD 2012 annual PGM modeling database that uses the Central California Ozone Study (CCOS) modeling domain depicted in **Figure A-1** would be appropriate for this analysis. For the hypothetical project screening analysis discussed in **Appendix B**, the BAAQMD 2012 annual CCOS domain PGM database was adapted for a reduced 4-km grid resolution domain covering the Sacramento and neighboring counties shown in **Figure B-2** that would also be appropriate for this analysis. The CCOS and reduced 4-km PGM modeling domains use a Lambert Conformal Conic (LCC) projection with the domain definitions given in **Table A-1**. BAAQMD performed WRF meteorological and SMOKE emissions modeling for the CCOS 4-km domain and 2012 calendar year in generating the 2012 CCOS domain PGM modeling database. The 2012 CCOS PGM modeling database was originally developed for the CMAQ PGM but has been extended for the CAMx PGM as well. Descriptions of the WRF meteorological, SMOKE emissions and CMAQ and CAMx PGM models are available on the BAAQMD's Research and Modeling website.[49]

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[46] https://www.arb.ca.gov/emfac/

[47] https://www.epa.gov/air-emissions-modeling/2014-2016-version-7-air-emissions-modeling-platforms

[48] https://www.epa.gov/csapr

[49] http://www.baaqmd.gov/about-air-quality/research-and-data/research-and-modeling

Table A-1. Definitions of the Northern California CCOS (Figure A-1) and reduced Sacramento (Figure B-2) 4-km grid resolution PGM modeling domains

Parameter	Value			
Projection	Lambert-Conformal Conic			
1st True Latitude	30 degrees N			
2nd True Latitude	60 degrees N			
Central Longitude	-120.5 degrees W			
Central Latitude	37 degrees N			
Domain	**NX**	**NY**	**X-Offset Origin (km)**	**Y-Offset Origin (km)**
CCOS (NCA)	185	185	-376	-292
Reduced (Sacramento)	78	106	-224	8

Future-year emission scenarios can be developed as far out as the 2035 year using ARB's county-level emissions by species and source category that are available on the ARB CEPAM webpage[50] and that can be used to project the 2012 emissions to a future year. A project's contribution to ozone and PM concentrations should be evaluated for the most appropriate future year(s) based on the characteristics of the project.

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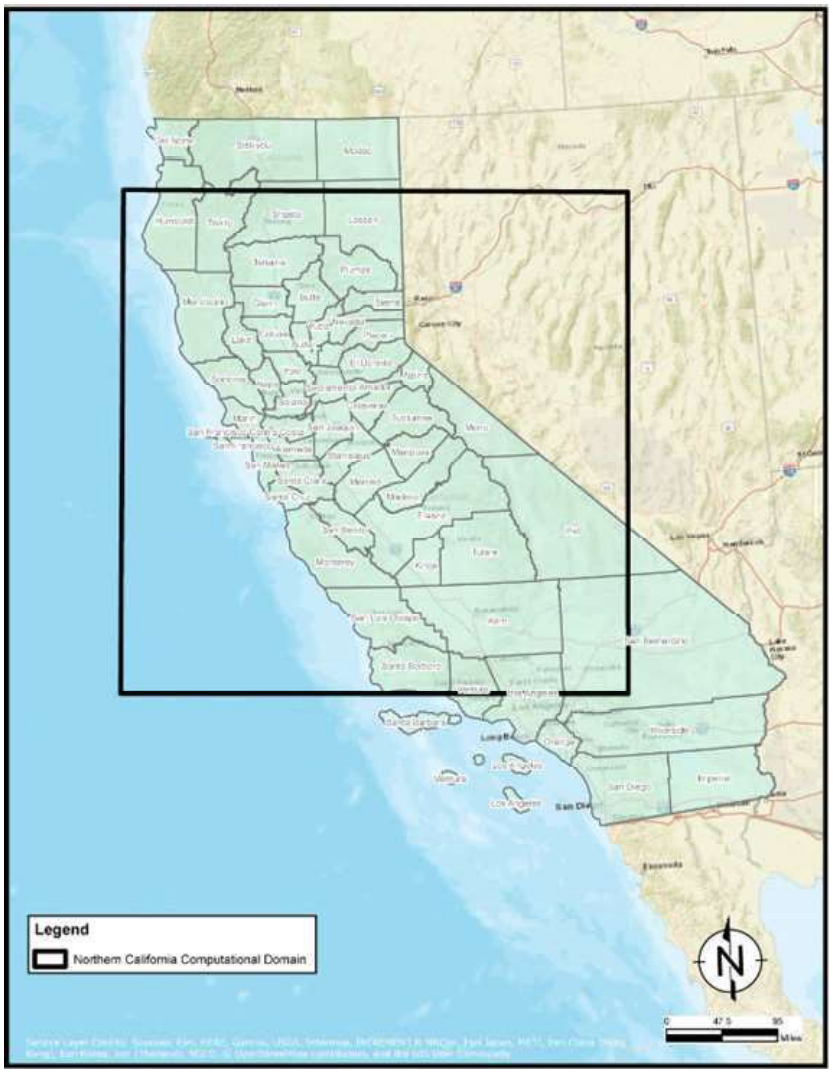
[50] https://www.arb.ca.gov/app/emsinv/fcemssumcat/fcemssumcat2016.php

Figure A-1. CCOS 4 km modeling domain for Northern California PGM modeling



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A.2.3 Approaches for Estimating Incremental Project Contributions

PGMs simulate emissions concentrations due to all sources, including all anthropogenic and natural emissions and transport from all upwind sources. There are several techniques that can be used to isolate the incremental contributions of emissions from a proposed CEQA project to ozone and PM concentrations:

1. Brute Force Method: In the Brute Force Method, the PGM is applied for a base case and a case where the project's emissions are added to the base case and the project's ozone and PM incremental impacts are obtained from the differences in the two simulations.

2. Source Apportionment Tools: Some PGMs (including CAMx and CMAQ) come instrumented with a source apportionment tool that uses tagged species (reactive tracers) that run in parallel to the host model and keeps track of the ozone and PM contributions due to user-selected source groups (e.g., emission from a CEQA Project).
3. Sensitivity Tools: Some PGMs also come with sensitivity tools that can track the sensitivity of ozone and PM to user-selected source groups that can be post-processed to get the source contributions.

The Brute Force Method can be used with any air quality model and could be a viable method for obtaining the ozone and PM contributions from a proposed CEQA project. However, because the project's incremental concentrations are obtained by calculating the difference between two PGM simulations, there is the potential to introduce model noise. Model noise in this case are changes in the two PGM simulations concentration estimates that are due to numerical artifacts not associated with the project's emissions. The aerosol thermodynamic module (ISORROPIA) used in CAMx and CMAQ is particularly prone to producing model noise in particle ammonium nitrate (NH_4NO_3) concentrations due to its complicated parameterization that includes branching. Given the small concentrations expected from CEQA projects, model noise could be a significant issue.

Source Apportionment methods alleviate the problem of model noise because only one simulation is performed. The CAMx Ozone and Particulate Source Apportionment Technology (OSAT/PSAT) tools have been used extensively by EPA and others, including in EPA's CSAPR (CSAPR Update[51]), which estimated upwind state contributions to downwind state nonattainment with details on the CSAPR CAMx source apportionment modeling contained in the CSAPR Air Quality Technical Support Document (AQTSD).[52] CAMx was also used by EPA to develop single-source or facility-level ozone and secondary $PM_{2.5}$ Modeled Emission Rate Precursors (MERPs[53]) significance threshold emission rates, a use similar to modeling a CEQA project's emissions ozone and $PM_{2.5}$ impacts. The CMAQ has the Integrated Source Apportionment Method (ISAM[54]) source apportionment tool for ozone and PM.

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Both CAMx and CMAQ have the Decoupled Direct Method (DDM) sensitivity tool. DDM operates similarly to the source apportionment tools, providing sensitivity coefficients only for user-selected source groups. However, DDM is much more computationally extensive than source apportionment. And for a single project, the Brute Force Method, which is another sensitivity method, is also more efficient. Thus, we do not recommend using DDM for this analysis.

Either the Brute Force or Source Apportionment methods are viable tools for estimating the incremental ozone and PM impacts due to emissions of a proposed CEQA project's emissions. Given that it is difficult to determine whether model noise will be a problem, the Source Apportionment method is a safer pathway so it is recommended in this guidance. If using CAMx, the Anthropogenic Precursor Culpability Assessment (APCA) version of the ozone source apportionment tool should be used.

[51] https://www.govinfo.gov/content/pkg/FR-2016-10-26/pdf/2016-22240.pdf.
[52] https://www.epa.gov/sites/production/files/2017-05/documents/aq_modeling_tsd_final_csapr_update.pdf.
[53] https://www3.epa.gov/ttn/scram/appendix_w/2016/MERPs_WebinarPresentation_01192017.pdf.
[54] https://github.com/USEPA/CMAQ/blob/master/DOCS/Users_Guide/CMAQ_UG_ch11_ISAM.md

A.3 EMISSIONS AND AIR QUALITY MODELING

The following sections describe how the CEQA project emissions are processed and the air quality modeling conducted using either the BAAQMD Northern California CCOS 4-km modeling domain or the Sacramento reduced 4-km modeling domain in the 2012 PGM modeling database.

A.3.1 Project Emissions

For most projects, the maximum daily emissions of criteria pollutants and their precursors from operation and construction should be used. In cases where there are projects with large seasonal variations in maximum daily emissions (e.g., wood stoves or fireplace use), the seasonal variation in the maximum daily emissions should be accounted for. If maximum daily emissions are not otherwise quantified in the environmental document, average daily emissions should be provided. At a minimum, emissions of NO_X, VOC, and $PM_{2.5}$ are required, unless one or more of these did not increase due to the project. If quantified and available, project emissions for CO and SO_2 should be provided as well. The development of detailed emissions inventories is an important component of any CEQA project analysis. However, for PGM modeling, the project emissions inventories need to be converted into the hourly gridded speciated emission inputs in the format used by the PGM. This is typically accomplished using the Sparse Matrix Kernel Emissions (SMOKE[55]) modeling system.

A.3.2 SMOKE Emissions Modeling of Project Emissions

The first step in the SMOKE emissions processing is to convert the project emission inventory into the Flat File 2010 (FF10) format for input to SMOKE. The emissions for each process of the project's emissions need to be assigned an appropriate Source Classification Code (SCC[56]) that is used to cross-reference to that particular source sector's typical chemical speciation and temporal allocation profile. SCCs are a 10-digit numerical code that represents a hierarchical classification of the source sectors emissions type. In this case, chemical speciation is performed for the SAPRC07 chemical mechanism used in the 2012 4-km PGM modeling database. Temporal allocation takes annual emissions or maximum daily emissions and distributes them to month of year, day of week, and hour of day using typical temporal profiles for each source sector as defined by the SCC. In some cases, there are source sectors that only operate during part of a year (e.g., residential wood combustion, home heating using wood stoves and fireplaces). In this case, separate SMOKE modeling using the maximum daily emissions for the different seasons is appropriate. EPA has a detailed website describing SCCs[57], although not all possible SCCs have a cross-reference to chemical speciation and temporal profiles in SMOKE. **Appendix E** presents several SCCs that are typically used to characterize source types in CEQA project emissions that are included in SMOKE's cross-reference file and can be used in populating the FF10 SMOKE input files.

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As part of the analysis, the project source emissions need to be spatially allocated to appropriate geographic locations (i.e., 4-km grid cells). The emissions can be allocated to modeling grid cells using gridding surrogates. To process the project emissions, a project area-based spatial surrogate needs to be developed. For many project sources the emission sources (e.g., construction) are allocated to the

[55] https://www.cmascenter.org/smoke/
[56] https://ofmpub.epa.gov/sccwebservices/sccsearch/docs/SCC-IntroToSCCs.pdf
[57] https://ofmpub.epa.gov/sccwebservices/sccsearch/

grid cell(s) containing the project. For more geographically complex project emission source categories (e.g., mobile source emissions associated with the project), the surrogate distributions can be developed using the USEPA's Spatial Allocation Tool,[58] which combines geographical information system (GIS)-based data (shapefiles) and modeling domain definitions to generate the appropriate gridded surrogate data set. In SMOKE, the project sources are assigned specific surrogates for gridding by cross-referencing the SCCs. All on-site project emissions are distributed in the modeling grid cell(s) where the project is located. On-road mobile sources are typically spatially distributed in the site's grid cells and surrounding grid cells based on roadway locations that can be defined using GIS shapefiles and the EPA surrogate tool. In some cases, CEQA projects have used transportation models to characterize the project's effects on mobile sources and to define the extent of the mobile source emissions spatial distribution.

The SMOKE system is then used to process emissions for the modeling domain, for example the CCOS 4-km modeling grid shown in **Figure A-1**. A representative week from each month (seven days a week for each month) is typically used to represent the entire month's emissions and obtain the correct day-of-week emissions. Holidays are typically modeled separately as if they were a Sunday. SMOKE should be applied to perform the following tasks:

1. Chemical Speciation: Emissions estimates of criteria pollutant precursors should be speciated for the SAPRC07 photochemical and AERO6 aerosol chemical mechanisms employed by the PGM in SMOKE processing. The speciation profiles compatible with the SAPRC07-AERO6 mechanism for $PM_{2.5}$ should be used to be consistent with the emissions used in the BAAQMD's modeling system used in this analysis. SMOKE outputs PGM emission inputs in the CMAQ PGM format that can be converted into CAMx-ready formats using CMAQ2CAMx conversion program and species mapping if CAMx is the PGM used. 43 CONT
2. Temporal Allocation: SMOKE resolves the annual emissions to a monthly, day-of-week and hour-of-day timescale for PGM modeling. These allocations are determined from the particular source category specified by the SCC. Monthly, weekly, and diurnal profiles are cross-referenced to SCC in the SMOKE processing to provide the appropriate temporal resolution.
3. Spatial Allocation: The project emissions estimates should be spatially resolved to the grid cells for modeling using spatial surrogates, as described above.

Standard quality assurance/quality control (QA/QC) of the emissions developed and SMOKE processing need to be conducted during all aspects of the SMOKE emissions processing. These steps should follow the approach recommended in the USEPA modeling guidance (USEPA, 2007). SMOKE includes quality assurance and reporting features to keep track of the adjustments at each processing stage and to ensure that data integrity is not compromised. The SMOKE log files should be carefully reviewed for error messages and ensured that appropriate source profiles were used. All error records reported during processing should be reviewed and any discrepancies resolved. This is important to ensure that source categories are correctly characterized. A key step in the QA/QC of the SMOKE emissions modeling is to compare SMOKE input and output emissions and to ensure that no emissions are dropped or added in the processing. As part of the documentation, summary tables of emissions should be generated to compare input inventory totals against model-ready output totals and to confirm

[58] https://www.cmascenter.org/sa-tools/documentation/4.2/html/srgtool/SurrogateToolUserGuide_4_2.pdf

consistency. Spatial plots should be generated to visually verify correct spatial allocation of the emissions.

The final step in the emissions processing is to merge the project's gridded emissions with other regional components through the gridded merge program (MRGUAM) for CAMx. The daily emissions for CAMx should be merged in the time format required by CAMx. If CAMx v7.0 or newer is used, then the individual "pre-merged" emission inputs can be provided separately in the CAMx inputs, so the final merge is not necessary. CMAQ can also take separate emission file inputs, so it also does not need a final merged step.

A.3.3 PGM Modeling of Project Emissions

PGM modeling is conducted for a future-year emissions scenario to isolate the contributions of the project's emissions to ozone and PM concentrations. As noted above, either the CAMx or CMAQ PGM models would be acceptable and the project's contributions could be obtained in either model using either the Brute Force or Source Apportionment approaches, but this guidance recommends that the Source Apportionment approach be used to isolate the project's ozone and $PM_{2.5}$ contributions, as the Brute Force method can be susceptible to model noise.

With CAMx, the Anthropogenic Precursor Culpability Assessment (APCA) ozone and PSAT PM source apportionment tools should be used. For CMAQ, the ISAM ozone and PM source apportionment tool should be used. The project emissions need to be separately tagged for tracking by the CAMx APCA/PSAT or CMAQ ISAM source apportionment tools. The CAMx user's guide[59] describes how to tag sources for treatment by and how to invoke the APCA/PSAT source apportionment tools. A CAMx APCA/PSAT source apportionment simulation will generate two hourly average concentration files: (1) the standard model output of hourly gridded total surface layer concentrations; and (2) an hourly output file of surface layer gridded concentrations for each APCA/PSAT source group. The standard output file with elimination (subtraction) of the APCA/PSAT concentration contributions from the project source group is defined as the Base Case, and the standard output that includes the contributions of the project's emissions is defined as the Project Case. Documentation on the CMAQ ISAM source apportionment tool is available on the CMAQ website.[60]

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The PGM Base Case and Project Case gridded hourly concentration outputs are processed to generate annual (365 days) gridded files for the following two species and averaging times:

- Daily average total $PM_{2.5}$ concentrations; and
- Maximum daily average 8-hour (MDA8) ozone concentrations.

It is recommended that spatial maps of the incremental $PM_{2.5}$ and ozone concentrations due to project's emissions be examined and reported as part of the QA/QC of the PGM modeling. At a minimum, the annual average and highest 24-hour average $PM_{2.5}$ and highest MDA8 ozone incremental concentrations due to the project's emissions be reported. **Figures B-3, B-4 and B-5** show examples of these types of displays for source 20 from the hypothetical minor source screening modeling discussed in **Appendix B**. The PGM gridded daily $PM_{2.5}$ and MDA8 ozone concentrations are used as inputs to BenMAP to obtain the incremental health effects due to the emissions of the project, as described in the next section.

[59] http://www.camx.com/files/camxusersguide_v6-50.pdf

[60] https://www.airqualitymodeling.org/index.php/CMAQv5.0.2_Integrated_Source_Apportionment

A.4 ESTIMATION OF HEALTH EFFECT IMPACTS

The potential health effects of ozone and $PM_{2.5}$ concentrations due to the project's emissions should be estimated using the Environmental Benefits Mapping and Analysis Program (BenMAP), Community Edition v1.5 (March 2019).[61] BenMAP, originally developed by the USEPA, is a powerful and flexible tool that helps users estimate human health effects and economic benefits resulting from changes in air quality. BenMAP outputs include PM- and ozone-related health endpoints such as premature mortality, hospital admissions, and emergency room visits. BenMAP uses the following simplified formula to express changes in ambient air pollution to certain health endpoints (AAI, 2018)[62]:

Health Effect = Air Quality Change × Health Effect Estimate × Exposed Population × Background Health Incidence

- Air Quality Change: The difference between the starting air pollution concentration level (the Base Case) and the air pollution concentration level after some change, such as a new source (e.g., emissions from a proposed CEQA project in the Project Case).
- Health Effect Estimate: An estimate of the percentage change in an adverse health effect due to a one-unit change in ambient air pollution. Effect estimates, also referred to as concentration-response (C-R) functions, are obtained from epidemiological studies.
- Exposed Population: The number of people affected by the air quality change. The government census office is a good source for this information. As noted below, we recommend the use of data from PopGrid, which is an add-on program to BenMAP that allocates the block-level U.S. Census population to a user-defined grid.[63] As new census data is collected, USEPA updates the BenMAP tool. 43 CONT
- Background Health Incidence: An estimate of the average number of people that die (or suffer from some adverse health effect) in a given population over a given period of time. For example, the health incidence rate might be the probability that a person will die in a given year. Health incidence rates and other health data are typically collected by the government as well as by the World Health Organization. The background incidence rates used here are obtained from BenMAP. Age-, cause-, and county-specific mortality rates are calculated by BenMAP using data from the Centers for Disease Control (CDC) WONDER database[64]. Hospitalization rates and emergency room visits are calculated using data from the Healthcare Cost and Utilization Project (HCUP). The relationship between short-term PM exposure and heart attacks have been determined using epidemiological studies.

A.4.1 Application of BenMAP

The PGM output data are processed to generate aggregated daily average $PM_{2.5}$ and MDA8 ozone concentrations appropriate for various health endpoints as described above. The PGM concentrations for a Base Case (i.e., without the project emissions) and a Project Case (i.e., the Base Case plus the contributions of the project emissions) are used as inputs to BenMAP, which internally takes the

[61] http://www.epa.gov/air/benmap/

[62] The common function used for calculating health effects is the following log-linear function: Health Effect = Background Health Incidence x [1 – exponential (Health Effect Estimate * Air Quality Change)] x Exposed Population

[63] https://www.epa.gov/benmap/benmap-community-edition

[64] http://wonder.cdc.gov

difference between the Base and Project Cases in order to obtain the incremental ozone and PM contributions due to the project. The PGM simulation results from the full year (January to December) are used to estimate the health effects of $PM_{2.5}$ and ozone. BenMAP translates increases in the pollutant concentrations due to the project emissions to changes in the incidence rate for each health effect using a C-R function derived from previously published epidemiological studies. BenMAP provides multiple C-R functions based on different epidemiological studies for a given health endpoint. We recommend using the USEPA default C-R functions that are used in national rulemaking when evaluating health effects. We also recommend using more refined population data that uses population data from PopGrid, which allocates the census population to each modeled 4x4 kilometer (km) grid cell (e.g., **Figure A-1**).

The population used for both the quantified health effects and the calculation of background health incidence presented here is usually calculated for a future year that has maximum project emissions.[65]

Although there are a large number of potential health endpoints that could be included in the analysis, we recommend using the key health endpoints that have been the focus of recent USEPA risk assessments (e.g., USEPA, 2010; USEPA, 2014). For example, the USEPA notes that health endpoints were selected based on consideration of at-risk populations (e.g. people with asthma), endpoints that have public health significance, and endpoints for which information is sufficient to support a quantitative concentration-response relationship (USEPA, 2014).

The $PM_{2.5}$ health endpoints and associated C-R functions that we recommend for use in this BenMAP analysis are presented in **Table A-2**. Each C-R function is based on a certain age range for the given health endpoint depending on the underlying epidemiological study on which it is based.

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The increases in the BenMAP-estimated health effect incidences and the background and percent of background health incidence due to the project emissions should be presented for each health endpoint in **Table A-2.** These values reflect the total health effects across the modeling domain (e.g., CCOS domain in **Figure A-1** or reduced 4-km Sacramento domain in **Figure B-1**) or across the Five-Air-District Region. Reporting the percent increase in each of the health effect endpoints across the Five-Air-District Region or other geographic region puts into context the incremental increase in health effects due to the project emissions.

[65] For background incidence rates, BenMAP projects likely mortality rates for future years, but for other health effects, incidence rates are based on population changes only and may not reflect rates for future years.

Table A-2. Summary of recommended $PM_{2.5}$ health endpoints

Health Endpoint	Age Range[2]	Daily Metric	Seasonal Metric	Annual Metric	C-R Function Selected[1]
Emergency Room Visits, Asthma	0-99	24-hr mean			Mar et al., 2010
Mortality, All Cause	30-99	24-hr mean	Quarterly mean	Mean	Krewski et al., 2009
Hospital Admissions, Asthma	0-64	24-hr mean	-	-	Sheppard, 2003
Hospital Admissions, All Cardiovascular (excluding Myocardial Infarctions)	65-99	24-hr mean	-	-	Bell, 2012
Hospital Admissions, All Respiratory	65-99	24-hr mean	-	-	Zanobetti et al., 2009
Acute Myocardial Infarction, Nonfatal	18-24	24-hr mean	-	-	Zanobetti et al., 2009
Acute Myocardial Infarction, Nonfatal	25-44	24-hr mean	-	-	
Acute Myocardial Infarction, Nonfatal	45-54	24-hr mean	-	-	
Acute Myocardial Infarction, Nonfatal	55-64	24-hr mean	-	-	
Acute Myocardial Infarction, Nonfatal	65-99	24-hr mean	-	-	

[1] C-R functions available in BenMAP (AAI, 2018)
[2] Other age ranges are available, but the studies shown here are the ones used by the EPA in its health assessments. The age ranges are consistent with each epidemiological study that is the basis of the health function.

As noted above, although a larger number of health endpoints could be evaluated, we recommend selecting the ozone health endpoints based on recent USEPA risk assessments (USEPA, 2010; USEPA, 2014). The health endpoints and associated C-R functions for ozone are presented in **Table A-3.** Each ozone C-R function is associated with a certain age range for the given health endpoint, depending on the epidemiological study on which it is based. Increases in the BenMAP-estimated health effects incidences and percent of background health incidence due to the project emissions across the Five-Air-District Region should be presented for each health endpoint. In addition, health incidences and percent of background health incidence due to project emissions can be reported for other geographic areas with justification.

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Table A-3. Summary of recommended ozone health endpoints

Health Endpoint	Age Range[3]	Daily Metric[2]	Seasonal Metric	Annual Metric	C-R Function Selected[1]
Hospital Admissions, All Respiratory	65 - 99	MDA8	-	-	Katsouyanni et al., 2009
Mortality, Non-Accidental	0 - 99	MDA8	-	-	Smith et al., 2009
Emergency Room Visits, Asthma	0 - 17	MDA8	-	-	Mar and Koenig, 2009
Emergency Room Visits, Asthma	18 - 99	MDA8	-	-	Mar and Koenig, 2009

1. C-R function available in BenMAP (AAI, 2018)
2. MDA8 = Maximum daily average 8-hour ozone concentration
3. Other age ranges are available, but the studies shown here are the ones used by the EPA in its health assessments. The age ranges are consistent with each epidemiological study conducted that is the basis of the health function.

The uncertainties in the CEQA project health effects analysis should be discussed, along with assumptions made, to ensure that the analysis is conservative (i.e., tending toward overstating the project's health effects). Many of these uncertainties are discussed below.

Due to the uncertainties in the health effects analysis, the CEQA Friant Ranch health effects analysis approach and methodology should be conducted in a fashion to ensure that the uncertainty is of a conservative nature. In addition to the conservative assumptions noted above that should be built into the emissions quantities (e.g., using maximum 24-hour emissions and year with maximum emissions), there are a number of assumptions that are built into the application of C-R functions in BenMAP that may lead to an overestimation of health effects. For example, for all-cause mortality health effects from $PM_{2.5}$, the estimates are based on a single epidemiological study that found an association between $PM_{2.5}$ concentrations and mortality. While similar studies suggest that such an association exists, there remains uncertainty regarding a clear causal link. This uncertainty stems from the limitations of epidemiological studies, such as inadequate exposure estimates and the inability to control for many factors that could explain the association between $PM_{2.5}$ and mortality, such as lifestyle factors like smoking. Several reviews have evaluated the scientific evidence of health effects from specific particulate components (e.g., Rohr and Wyzga 2012; Lippmann and Chen, 2009; Kelly and Fussell, 2007). These reviews indicate that the evidence is strongest for combustion-derived components of PM including elemental carbon (EC), organic carbon (OC) and various metals (e.g., nickel and vanadium). However, there are still no definitive data that point to any particular component of PM as being more toxic than other components. The USEPA has also stated that results from various studies have shown the importance of considering particle size, composition, and particle source in determining the health effects of PM (USEPA, 2009). Further, the USEPA (2009) found that studies have reported that particles from industrial sources and from coal combustion appear to be the most significant contributors to PM-related mortality, consistent with the findings by Rohr and Wyzga (2012) and others. This is particularly important to note here, as in many projects a large portion of primary PM emissions are from entrained roadway dust and not from combustion.

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CONT

For both the $PM_{2.5}$ and ozone health effects calculated, each of the pollutants may be a confounder of the other. Thus, while the C-R functions are derived from studies that evaluated the effects for each pollutant individually, both air pollutants could contribute to the health effect outcomes evaluated, and thus the overall impacts may be overstated.

Another uncertainty highlighted by the USEPA (2012) that applies to potential health effects from both $PM_{2.5}$ and ozone is the assumption of a log-linear response between exposure and health effects, without consideration for a threshold below which effects may not be measurable. The issue of a threshold for $PM_{2.5}$ and ozone is highly debatable and can have significant implications for health effects analyses as it requires consideration of current air pollution levels and calculating effects only for areas that exceed threshold levels. Without consideration of a threshold, any incremental contribution to existing ambient air pollution levels, whether below or above the applicable threshold for a given criteria pollutant, is assumed to adversely affect health. Although the USEPA traditionally does not consider thresholds in its cost-benefit analyses, the NAAQS itself is a health-based threshold level that the USEPA has developed, based on evaluating the most current evidence of health effects.

As noted above, the health effects estimation using this method presumes that effects seen at large concentration differences can be linearly scaled down to (i.e., correspond to) small increases in concentration, with no consideration of potential thresholds below which health effects may not occur. This methodology of linearly scaling health effects is broadly accepted for use in regulatory evaluations and is considered as being health protective (USEPA, 2010), but potentially overstates the potential health effects. In summary, health effects presented using the procedures in this guidance are conservatively estimated, and the actual effects may be zero.

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CONT

A.4.2 Documentation of Results

The results of the health effects assessment should be documented in a brief technical report in plain English that clearly describes how the project's emissions of air pollutants are correlated to health effects. The report should include sufficient detail to enable those who are skilled in the art (and who did not participate in its preparation) to understand the procedures that were used and to consider meaningfully the issues the proposed project raises.

The technical reports should include the following sections: Introduction, Technical Approach, and Results. The technical report should include details on how the PGM was selected and the source of the database used in its operation. It should include details on the emissions used in the PGM as well as a rationale that includes information on the geographical distribution of emissions within the modeling domain. This is particularly important if offsite traffic comprises a significant part of the emissions. The technical report should include details on the speciation of emissions and how the individual emissions were allocated among various source groups. The technical report should include details on how the PGM was operated as well as the important technical choices made and include QA/QC procedures and displays (e.g., spatial maps like in **Figures B-3, B-4 and B-5**). While not recommended unless there is ample evidence to justify it, the user may have some rationale for using C-R responses that are different from the defaults found in BenMAP. Should those be used, the technical report should contain the justification for departure from default C-R responses, as well as details on the C-R responses that were used. The technical report should also contain information on uncertainties in the various steps of the process.

The report should put the health effects into context by comparing them to background rates in the population at large, expressing them as a percent of the background health effects. This comparison can be done using data from the BenMAP model. For perspective, previous evaluations of large developments have shown that the estimated increases in those health effect incidences are fairly minor compared to the background values.

The report should also note that the health effects estimation using BenMAP presumes that effects seen at large concentration differences can be linearly scaled down to small increases in concentration. Accordingly, the report should note that the health effects are conservatively estimated.

Section 7 of the guidance provides additional health context and resources that should be included in the results documentation.

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CONT

A.5 REFERENCES

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CONT

APPENDIX B
SCREENING LEVEL HEATH EFFECTS ANALYSIS

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CONT

B.1 INTRODUCTION

A screening analysis using PGM and BenMAP modeling of hypothetical projects within the Sac Metro Air District and neighboring areas was conducted. The screening level health effects analysis was conducted by first identifying locations where potential new projects may be located within the Five-Air-District Region that also includes the entire Sacramento Federal Nonattainment Area (SFNA): Sacramento, Placer, El Dorado, Feather River and Yolo Solano air districts.

Using the methods described in **Appendix A**, emissions equal to the CEQA thresholds of significance were assumed to occur in 41 representative project locations. The PGM modeling results were then put into BenMAP in order to estimate the health effects that may result from development in each of these locations. The resulting screening level health effects for each of the 41 hypothetical project locations were generated. In addition, Ramboll developed an interactive Minor Project Health Effects Screening Tool in an Excel spreadsheet that allows the user to input a specific proposed project location and the resultant health effects for a project at the maximum TOS emission rates are interpolated from the 41 representative project locations to the point of the proposed project location. This tool is further described in this section.

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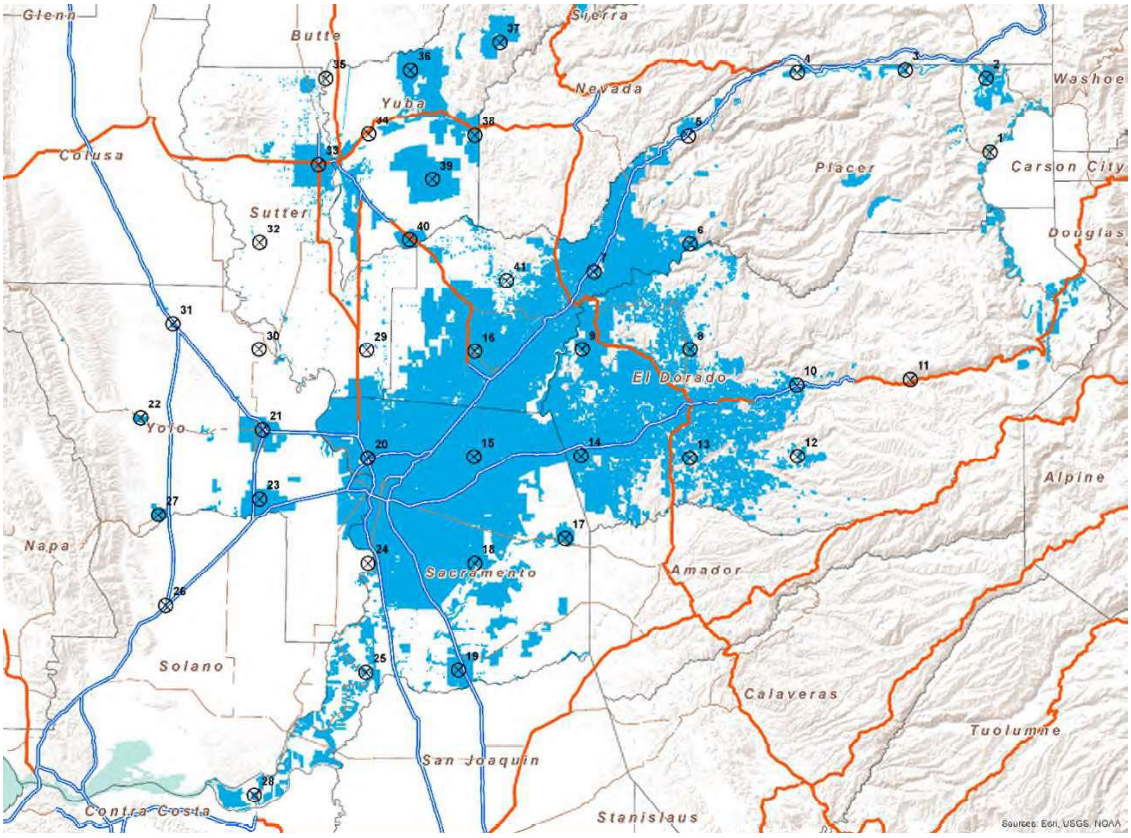
CONT

B.2 HYPOTHETICAL PROJECT DEFINITIONS

B.2.1 Hypothetical Project Locations

The potential project locations for the screening-level health effects analysis were determined by overlaying the 2050 Sacramento Area Council of Governments estimate of potential project development in the Five-Air-District Region on the 4-km gridded domain area, as shown in the blue shaded area in **Figure B-1.** A sufficient number of hypothetical project locations were selected in order to represent the different meteorological and transport conditions across the region, but not so many that the computational burden of the air quality model simulation became prohibitive. Based on this information, 41 hypothetical project source locations were chosen, shown in **Figure B-1**. Each hypothetical project site represents a source of precursor emissions for $PM_{2.5}$ and ozone.

Figure B-1 Potential CEQA project locations (blue shading) in the 5-Air-District Region along with locations of the 41 hypothetical project sources used in the screening modeling.



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B.2.2 Emissions for Each Hypothetical Project Source

The screening methodology is intended to provide preparers of environmental documentation a conservative estimate of health effects for projects at any location within the Five-Air-District Region that has emissions at or lower than the significance thresholds for all pollutants. Each of the five air districts within the SFNA has its own thresholds of significance for emissions of air pollutants, as shown in **Table B-1**. The highest threshold of significance for any district within the SFNA is 82 lbs./day each for NO_X, ROG, $PM_{2.5}$ and PM_{10}. Therefore, 82 lbs./day each of NO_X, ROG and $PM_{2.5}$ was chosen as the emission rate for each of these hypothetical project sources. Although SO_2 and CO aren't pollutants with thresholds of significance levels in the five air districts that comprise the SFNA, they are often associated with projects and they do impact ozone and secondary particulate formation.

In order to characterize the appropriate emission levels of SO_2 and CO, the emissions inventories for six projects from Sacramento County were reviewed and compared to the emissions of NOx. Based on the ratios of the emissions of SO_2 to NOx and CO to NOx, the relative SO_2 and CO emissions rates for a project where its NOx emissions were at the threshold of significance were calculated to be 0.98 lbs./day and 262 lbs./day, respectively. These emissions rates are therefore representative of SO_2 and CO emissions from residential and commercial projects relative to the emissions of NO_X at the threshold of significance levels of 82 lbs./day. This calculation is further discussed in **Appendix D**.

The health effects from any project with emissions below the thresholds of significance will be lower than the health effects presented in this screening analysis.

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Table B-1. Thresholds of significance

Pollutants in lbs./day (with some exceptions, noted)				
Air District	**NOX**	**ROG**	**PM10**	**PM2.5**
Sacramento	65	65	80	**82**
Placer	55	55	**82**	Not established
El Dorado	**82**	**82**	Cause or contribute to an exceedance of ambient air quality standards (AAQS)	Cause or contribute to an exceedance of ambient air quality standards (AAQS)
Feather River	25	25	80	Not established
Yolo Solano	55[a]	55[a]	80	Not established

[a.] 55 lbs./day is equivalent to 10 tons/year adopted threshold
[b.] **Red** indicates the highest emission rate among the five districts

B.3 PGM SCREENING MODELING

B.3.1 Reduced 4-km Modeling Domain

The 2012 BAAQMD modeling platform for the CCOS domain shown in **Figure A-1** was adapted for the health effects screening analysis. The CCOS domain covers large portions of northern California and western Nevada where we would expect there to be no significant health effects due to a CEQA project within the Five-Air-District Region. Thus, we reduced the size of the CCOS domain to the red domain embedded in the CCOS domain shown in **Figure B-2**. The boundary conditions for the smaller 4-km domain in **Figure B-2** were based on a CAMx simulation of the larger CCOS domain (**Figure A-1**). As QA for the new 2012 reduced Sacramento modeling domain database, we performed a CAMx base case simulation using the reduced domain and found that it produced essentially the same ozone and PM results as the CAMx full CCOS domain simulation.

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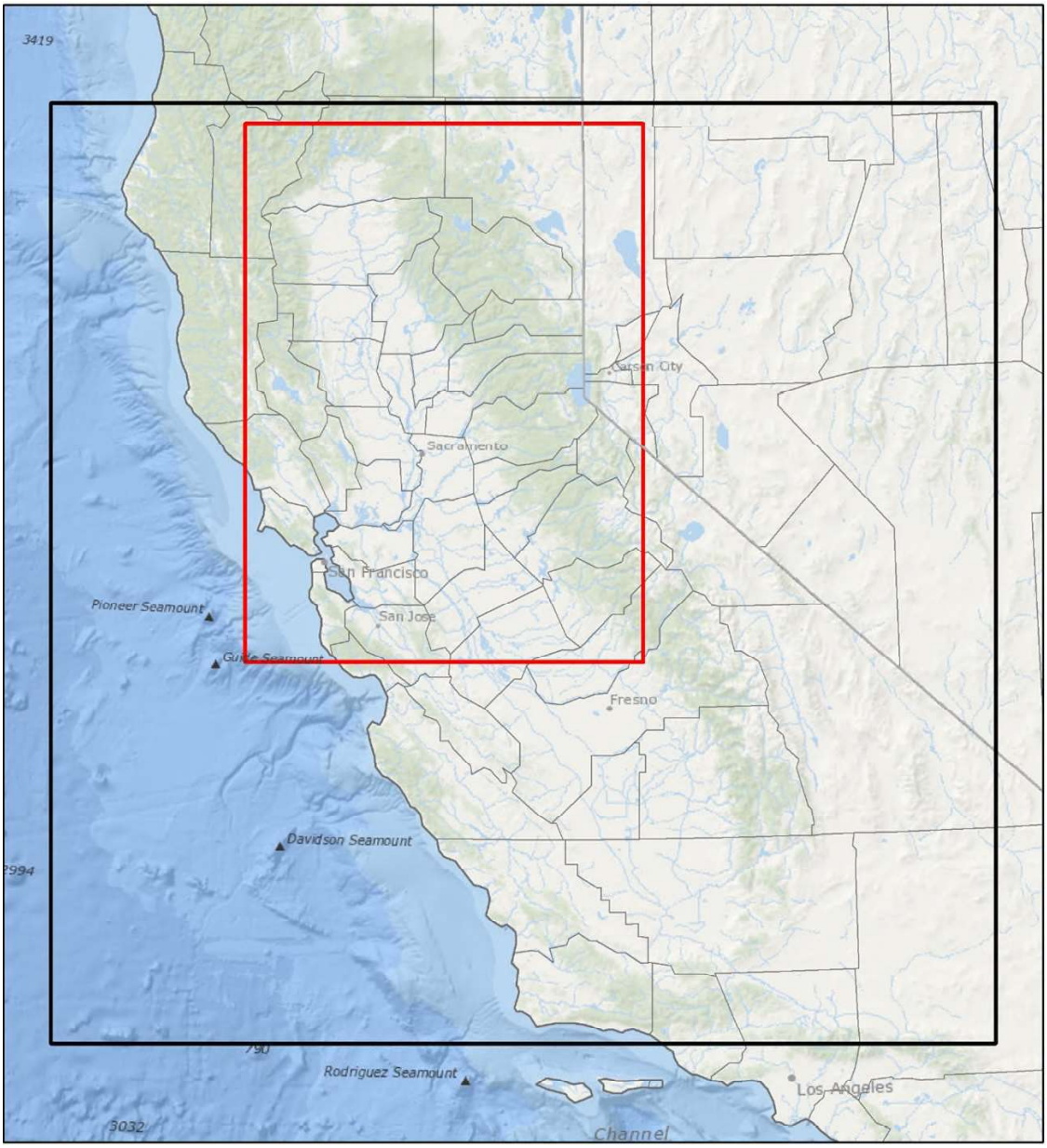
Figure B-2. Sac Metro Air District CAMx 4-km domain (red box) used in the screening analysis embedded in the 4-km CCOS domain (black box) covering northern California.



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B.3.2 Emissions used in the Screening Analysis

The 2035 anthropogenic emissions for the reduced 4-km modeling domain **(Figure B-2)** were obtained by projecting the BAAQMD 2012 anthropogenic emissions to 2035 using the ARB CEPAM[66] emission projections.

As discussed in **Section B.1.2**, each of the 41 hypothetical projects were assumed to have NO_X, ROG and $PM_{2.5}$ emissions of 82 lbs./day with SO_2 and CO emissions of 0.98 lbs./day and 262 lbs./day, respectively. The hypothetical project ROG (also known as VOC) emissions were speciated into the VOC species used in the SAPRC07 chemical mechanism that is used by CAMx with speciation profiles based on the typical mix of sources types in a CEQA project as described in **Appendix D**. The emissions were assumed to be released near the surface (i.e., in layer 1), which is also typical for CEQA projects in the region.

B.3.3 PGM Modeling

The CAMx PGM was used to simulate the incremental ozone and PM concentrations due to emissions from each of the 41 hypothetical project sources. Emissions from each of the 41 hypothetical sources were separately tagged for treatment by the CAMx APCA/PSAT ozone/PM source apportionment tools. The CAMx standard and source apportionment output was processed to generate Base Case concentrations that consisted of CAMx standard model output minus the contributions of all 41 hypothetical sources. Then, the contributions of each individual hypothetical project were separately added to the Base Case for each Project Case. The PGM estimated gridded daily 24-hour average $PM_{2.5}$ and MDA8 ozone concentrations for the Base Case and Project Case that were then used in the health effects modeling.

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CONT

Figures B-3, B-4 and B-5 display the incremental $PM_{2.5}$ and ozone concentrations due to hypothetical source number 20, which is located near the intersection of I-80 and I-5 (see **Figure B-1**). For annual average $PM_{2.5}$ concentrations, the maximum contribution due to hypothetical source 20 is 0.44 µg/m^3 and occurs close to the source location (**Figure B-3**). The highest daily $PM_{2.5}$ (**Figure B-4**) and MDA8 ozone (**Figure B-5**) concentrations due to hypothetical source 20 are, respectively, 1.69 µg/m^3 and 0.38 ppb, and also occur close to the location of source 20.

[66] https://www.arb.ca.gov/app/emsinv/fcemssumcat/fcemssumcat2016.php

Figure B-3. Map of the incremental annual average $PM_{2.5}$ concentrations (µg/m³) due to emissions from hypothetical source 20.

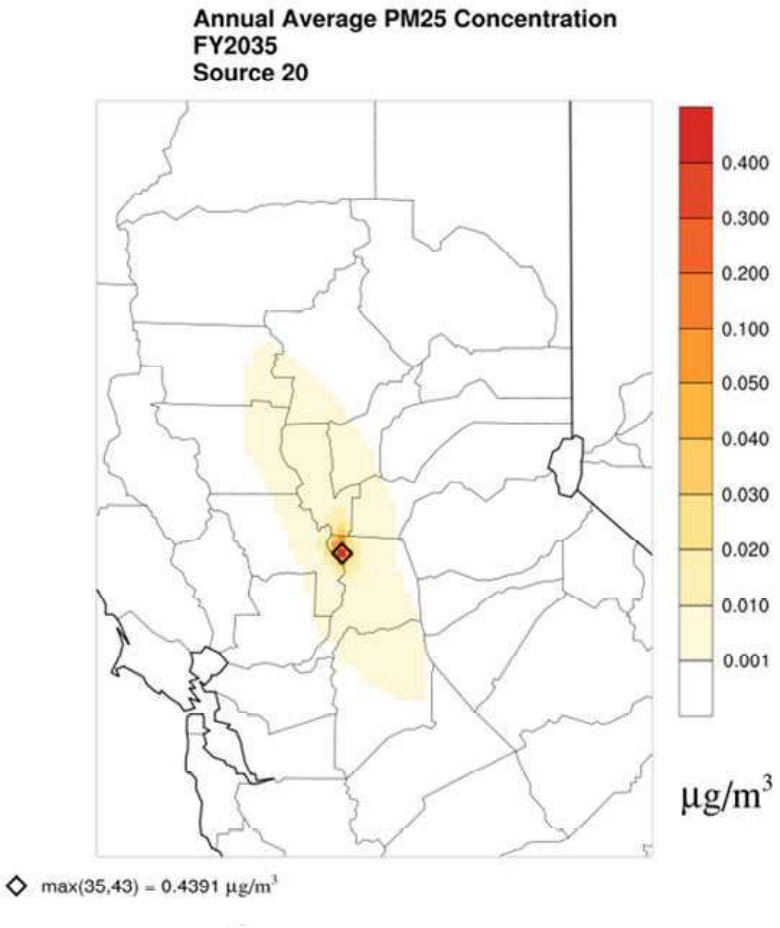

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Figure B-4. Map of the incremental maximum 24-hour average $PM_{2.5}$ concentrations ($\mu g/m^3$) due to emissions from hypothetical source 20.

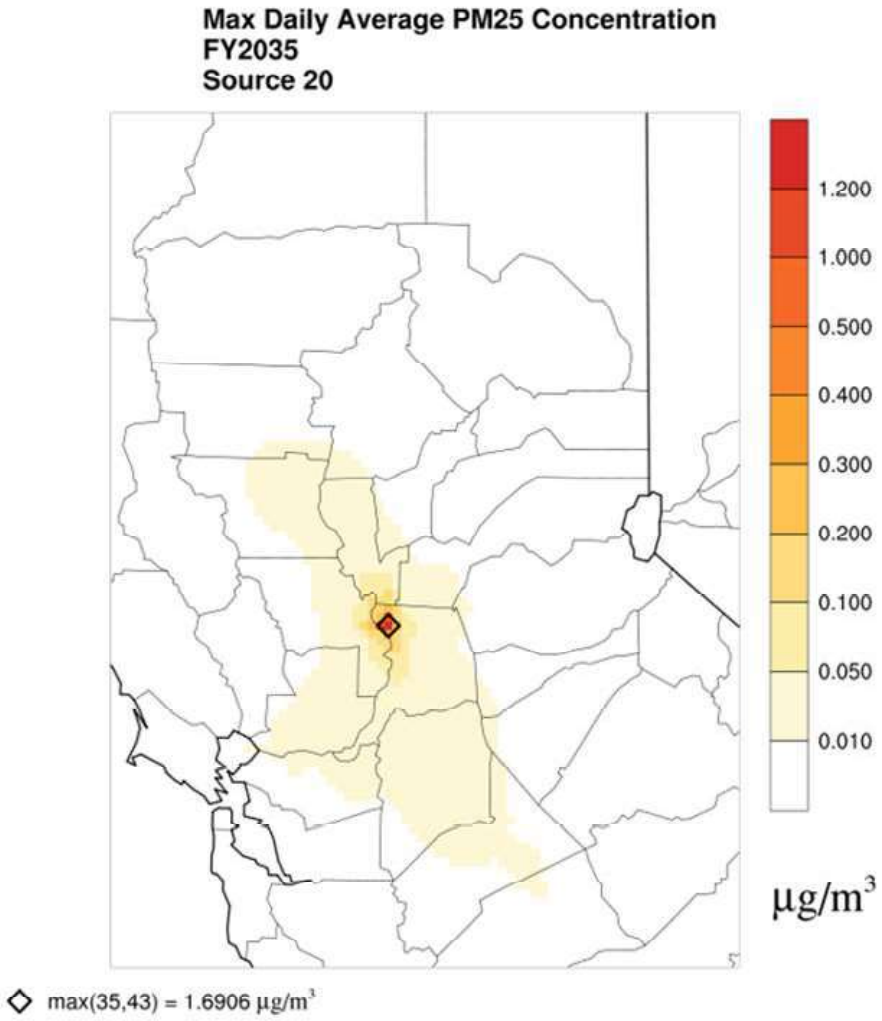

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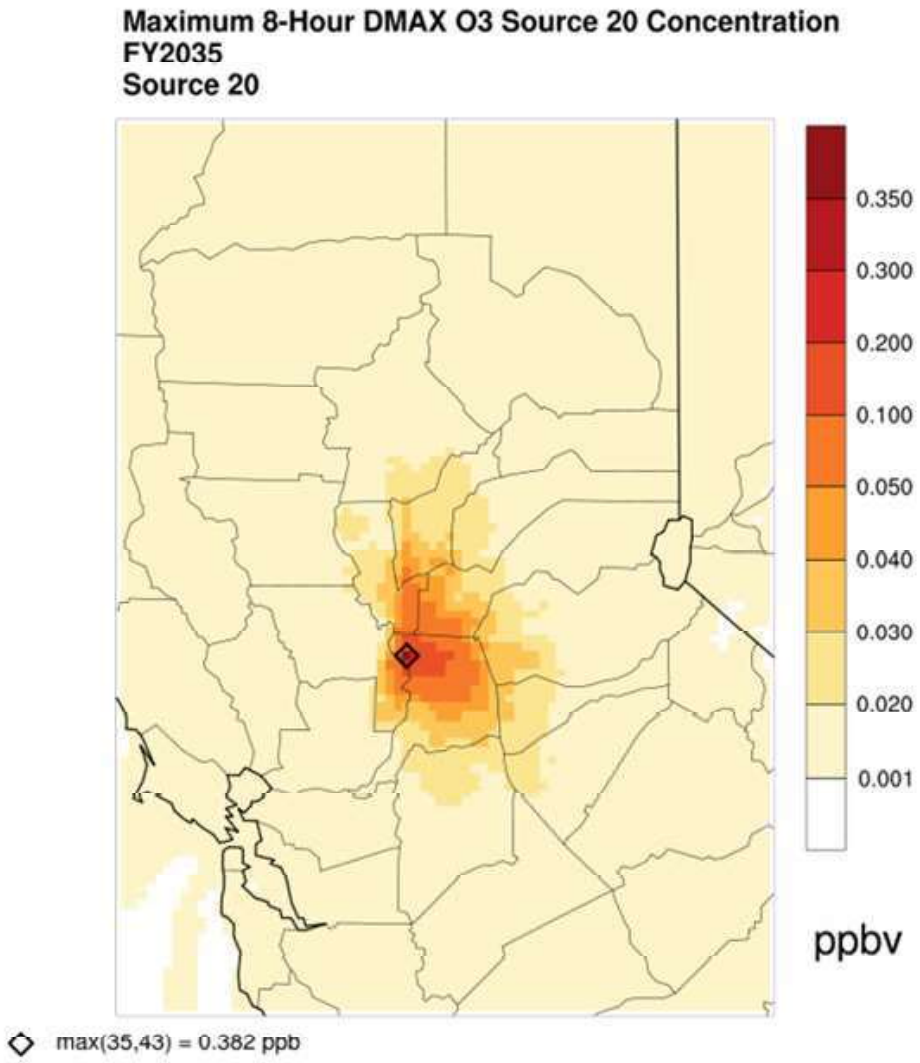
Figure B-5. Map of the incremental highest MDA8 ozone concentrations (ppb) due to emissions from hypothetical source 20.



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B.4 HEALTH EFFECTS MODELING

B.4.1 BenMAP Simulator

EPA's BenMAP air pollution health effects tool is a Windows-based program with the flexibility to use several alternative Concentration-Response (C-R) functions. The application of BenMAP for the 41 hypothetical projects would be quite time-consuming. Thus, a Python-based BenMAP simulator was developed that could efficiently estimate the health effect impacts of the 41 hypothetical projects using the CAMx source apportionment modeling results. The specific default C-R functions identified in **Appendix A** (**Tables A-2** and **A-3**) were implemented in the Python-based BenMAP simulator.

The Python-based BenMAP simulator was run for the 41 hypothetical project locations shown in **Figure B-1** using the CAMx Base Case and Project Case modeling results. We then ran BenMAP using the CAMx 2035 annual source apportionment modeling results for hypothetical project number 20, which, because it is in the City of Sacramento, represents one of the hypothetical sources with relatively higher health effects than others. **Tables B-2** and **B-3** display the resultant $PM_{2.5}$ and ozone health effects from running the EPA BenMAP and Python-based BenMAP simulator on the CAMx source apportionment modeling results for hypothetical source number 20. To three significant digits, the results are identical. Because the Python-based simulator uses higher precision than BenMAP, the results are not identical when looking out to more significant decimal places. For example, to four significant digits the premature mortality due to PM across the entire modeling domain for hypothetical project number 20 is 2.289 per year using BenMAP and 2.287 per year using the Python-based BenMAP simulator. These less-than-0.1% differences do not change any aspects of the health effects assessment. Summaries of the potential health effects across the modeling, like those presented in Tables **B-2** and **B-3** for hypothetical source 20, are provided for each one of the 41 hypothetical sources in **Appendix F**. Note that in addition to the project's incremental health effects, the percent increase of the health effects over the background health effects should also be presented. For example, for hypothetical source 20, the increase of 2.06 premature mortalities per year within the Five-Air-District Region that is due to increased PM concentrations from the project's emissions represents a 0.005% increase over the background value of the Five-Air-District Region; thus, this is a very small increase.

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CONT

Table B-2. Health effects for hypothetical project number 20 produced by EPA's BenMAP program.

BenMAP					
Run with PopGrid populations - Source 20					
$PM_{2.5}$ Health Endpoint	Age Range*	Incidences Across the Reduced Sacramento 4-km Modeling Domain Resulting from Project Emissions (per year)	Incidences Across the 5-Air District Region Resulting from Project Emissions (per year)	Percent of Background Health Incidences Across the 5-Air District Region**	Total Number of Health Incidences Across the 5-Air District Region (per year)**
		(Mean)	(Mean)		
Emergency Room Visits, Asthma	0 - 99	1.45	1.36	0.0074	18419
Mortality, All Cause	30 - 99	2.29	2.06	0.0046	44766
Hospital Admissions, Asthma	0 - 64	0.097	0.092	0.0050	1846
Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	0.19	0.17	0.00071	24037
Hospital Admissions, All Respiratory	65 - 99	0.34	0.30	0.0015	19644
Acute Myocardial Infarction, Nonfatal	18 - 24	0.00013	0.00012	0.0032	4
Acute Myocardial Infarction, Nonfatal	25 - 44	0.012	0.012	0.0038	308
Acute Myocardial Infarction, Nonfatal	45 - 54	0.025	0.024	0.0032	741
Acute Myocardial Infarction, Nonfatal	55 - 64	0.040	0.038	0.0031	1239
Acute Myocardial Infarction, Nonfatal	65 - 99	0.12	0.11	0.0022	5052

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CONT

Ozone Health Endpoint	Age Range*	Incidences Across the Reduced Sacramento 4-km Modeling Domain Resulting from Project Emissions (per year) (Mean)	Incidences Across the 5-Air-District Region Resulting from Project Emissions (per year) (Mean)	Percent of Background Health Incidences Across the 5-Air-District Region**	Total Number of Health Incidences Across the 5-Air-District Region (per year)**
Hospital Admissions, All Respiratory	65 - 99	0.085	0.065	0.00033	19644
Mortality, Non-Accidental	0 - 99	0.053	0.043	0.00014	30386
Emergency Room Visits, Asthma	0 - 17	0.46	0.39	0.0066	5859
Emergency Room Visits, Asthma	18 - 99	0.72	0.61	0.0049	12560

* Other age ranges are available, but the studies shown here are the ones used by the EPA in their health assessments. The age ranges are consistent with each epidemiological study that is the basis of the health function.

** The percent of background health incidence uses the mean incidence. The background health incidence is an estimate of the average number of people that are affected by the health endpoint in a given population over a given period of time. In this case, these background incidence rates cover the Five-Air-District domain. Health incidence rates and other health data are typically collected by the government as well as the World Health Organization. The background incidence rates used here are obtained from BenMAP.

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CONT

Table B-3. Health effects for hypothetical project number 20 produced by the Python-based BenMAP simulator.

BenMAP-Python					
Run with PopGrid populations - Source 20					
$PM_{2.5}$ Health Endpoint	**Age Range***	**Incidences Across the Reduced Sacramento 4-km Modeling Domain Resulting from Project Emissions (per year)**	**Incidences Across the 5-Air-District Region Resulting from Project Emissions (per year)**	**Percent of Background Health Incidences Across the 5-Air-District Region****	**Total Number of Health Incidences Across the 5-Air-District Region (per year)****
		(Mean)	**(Mean)**		
Emergency Room Visits, Asthma	0 - 99	1.46	1.37	0.0074	18419
Mortality, All Cause	30 - 99	2.29	2.06	0.0046	44766
Hospital Admissions, Asthma	0 - 64	0.097	0.092	0.0050	1846
Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	0.19	0.17	0.00071	24037
Hospital Admissions, All Respiratory	65 - 99	0.34	0.30	0.0015	19644
Acute Myocardial Infarction, Nonfatal	18 - 24	0.00013	0.00012	0.0032	4
Acute Myocardial Infarction, Nonfatal	25 - 44	0.012	0.012	0.0038	308
Acute Myocardial Infarction, Nonfatal	45 - 54	0.025	0.024	0.0032	741
Acute Myocardial Infarction, Nonfatal	55 - 64	0.0398	0.038	0.0031	1239
Acute Myocardial Infarction, Nonfatal	65 - 99	0.12	0.11	0.0022	5052

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Ozone Health Endpoint	Age Range*	Incidences Across the Reduced Sacramento 4-km Modeling Domain Resulting from Project Emissions (per year) (Mean)	Incidences Across the 5-Air-District Region Resulting from Project Emissions (per year) (Mean)	Percent of Background Health Incidences Across the 5-Air-District Region**	Total Number of Health Incidences Across the 5-Air-District Region (per year)**
Hospital Admissions, All Respiratory	65 - 99	0.085	0.065	0.00033	19644
Mortality, Non-Accidental	0 - 99	0.053	0.043	0.00014	30386
Emergency Room Visits, Asthma	0 - 17	0.46	0.39	0.0067	5859
Emergency Room Visits, Asthma	18 - 99	0.72	0.61	0.0049	12560

* Other age ranges are available, but the studies shown here are the ones used by the EPA in its health assessments. The age ranges are consistent with each epidemiological study that is the basis of the health function.

** The percent of background health incidence uses the mean incidence. The background health incidence is an estimate of the average number of people that are affected by the health endpoint in a given population over a given period of time. In this case, these background incidence rates cover the Five-Air-District domain. Health incidence rates and other health data are typically collected by the government as well as the World Health Organization. The background incidence rates used here are obtained from BenMAP.

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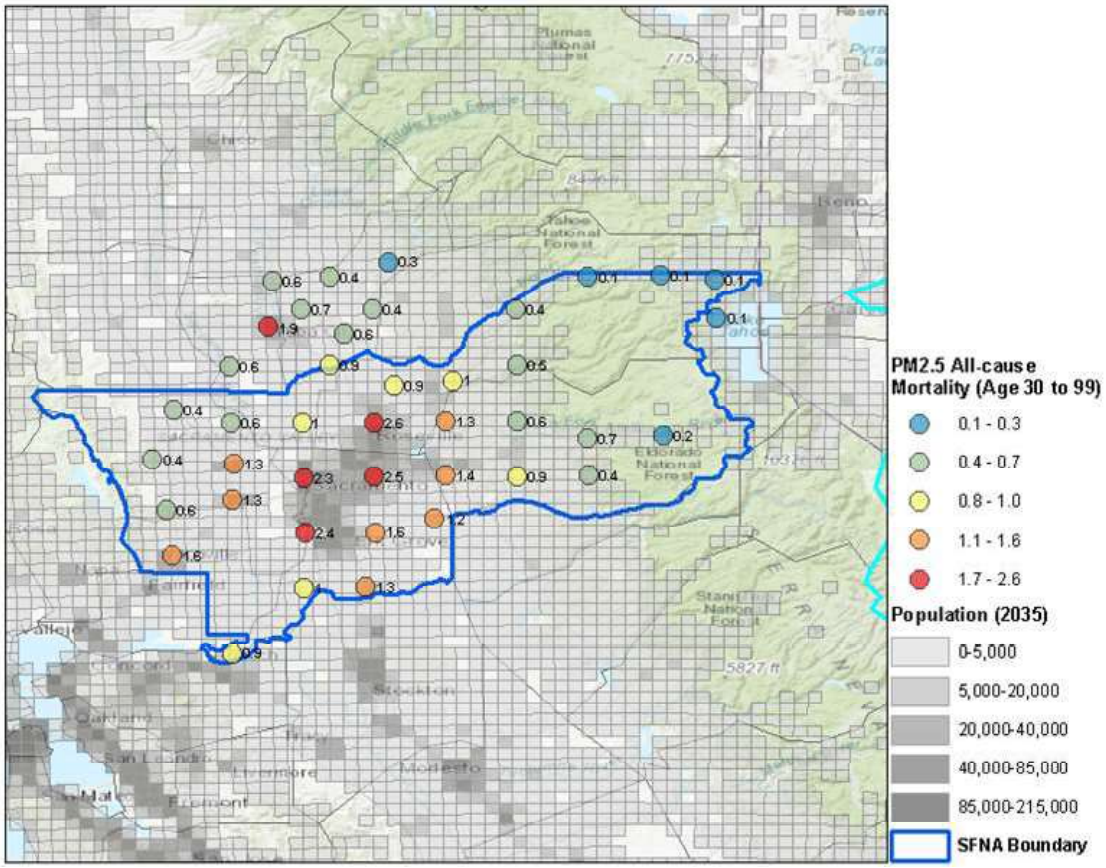
B.4.2 Screening Modeling Health Effects Results

The estimated health effects due to a change in $PM_{2.5}$ and ozone concentrations resulting from emissions for each of the 41 hypothetical project sources are provided in **Appendix F. Figure B-6** displays a map of the total PM mortality health effects results of all 41 hypothetical projects. Even though all 41 hypothetical projects have the same emissions, their health effects can vary by over an order of magnitude (e.g., from 0.1 to 2.6). Atmospheric chemistry and dispersion can play a role in the differences in a hypothetical source's concentrations and resulting health effects in different locations, but the primary difference in a hypothetical project's health effects is the source's proximity to population centers. For example, the hypothetical sources located in the City of Sacramento have greater health effects than those in the Sierra Nevada mountains.

Figure B-6. Hypothetical project PM mortality health effects superimposed on population density with SFNA boundary outline.



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B.4.3 Minor Project Health Effects Screening Tool

A simple screening health effects spreadsheet tool was developed by interpolating the health effects from the 41 hypothetical source locations to each 4-km grid in the Sac Metro Air District and neighboring air districts. The spatial interpolation was performed using python's SciPy implementation of the radial basis function interpolation.[67] Multiple basis functions were tested, but the linear function was selected because it provides higher values for the interpolated health effects and therefore was considered more conservative for the purposes of the screening tool implementation. The user can input the latitude/longitude location of a proposed project and the spreadsheet will generate a table of health effects corresponding to the threshold of significance emissions rate at the proposed project location.

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[67] https://docs.scipy.org/doc/scipy/reference/generated/scipy.interpolate.Rbf.html

APPENDIX C
STRATEGIC AREA PROJECT HEALTH EFFECTS ANALYSIS

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CONT

C.1 STRATEGIC AREA HEALTH EFFECTS RESULTS

This Appendix describes the Friant Ranch strategic area health effects screening modeling analysis for potential projects in the Sac Metro Air District and neighboring air districts.

C.1.1 Strategic Area Project Screening Modeling

The Sac Metro Air District provided six locations for potential projects that represent the general areas in which projects exceeding thresholds of significance levels would be expected to occur. The six potential locations are listed in **Table C-1** and shown in **Figure C-1**.

Table C-1. Coordinates for 6 hypothetical strategic area projects.

ID	Name	Latitude	Longitude	Location
I	West Roseville	38.765833	-121.359299	Fiddyment Road & Pleasant Grove Boulevard
II	Rancho Cordova	38.588080	-121.286765	Zinfandel Drive & White Rock Road
III	Downtown Sacramento	38.579336	-121.494119	10th Street & K Street
IV	South Sacramento	38.490489	-121.468468	Florin Road & Franklin Boulevard
V	Woodland	38.677388	-121.765759	Main Street & East Street
VI	Vacaville	38.347954	-121.998058	Merchant Street & Lincoln Highway

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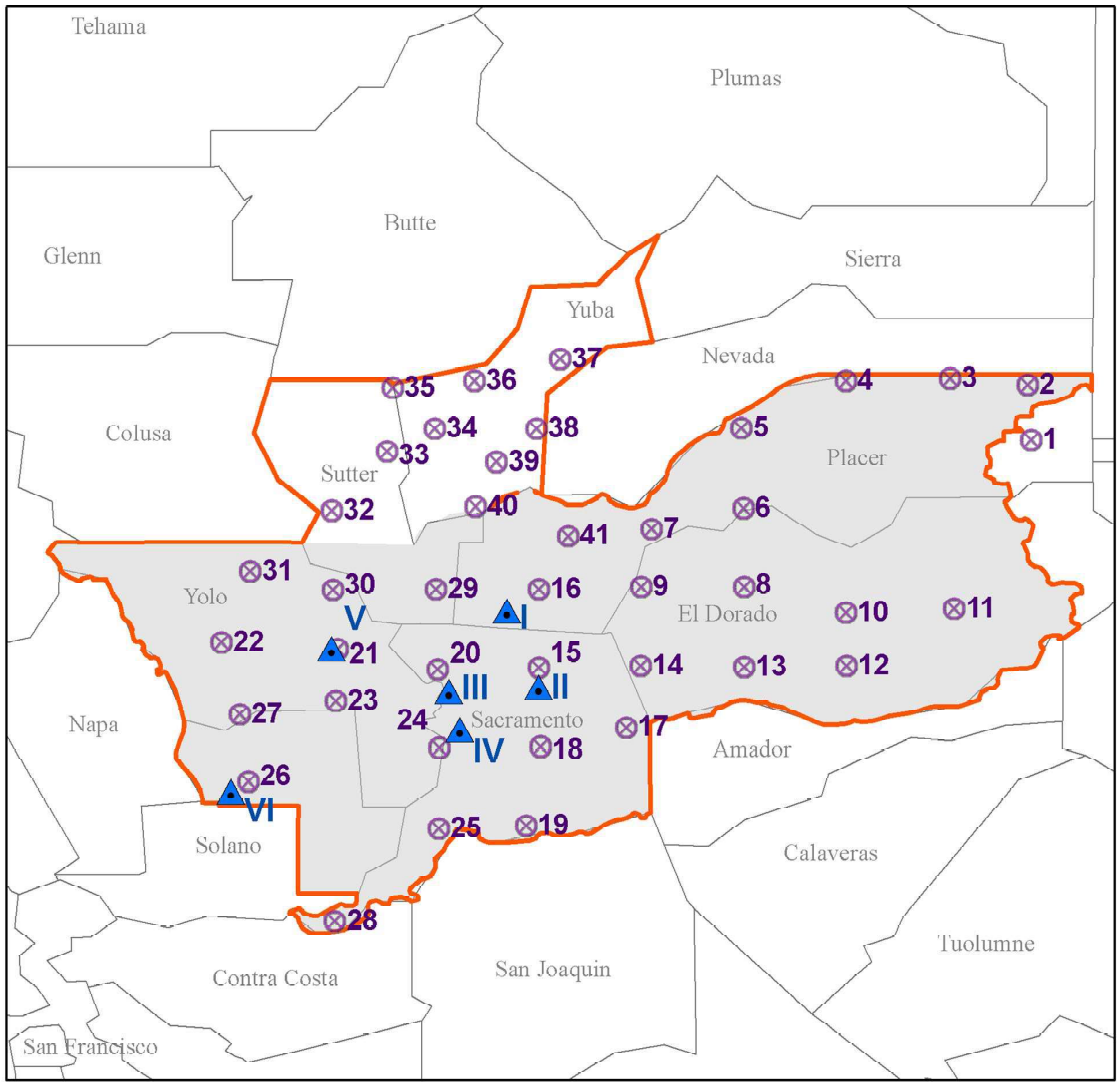
Figure C-1. Locations of six projects I-VI used in the strategic area screening modeling, along with the 41 hypothetical Projects used in the minor project analysis and boundary of the Five-Air-District Region (red) with the SFNA shaded grey.



The project screening modeling was run at each of the six locations at two levels of emissions, corresponding to two times (2x) and 8 times (8x) the threshold of significance level, which is 82 lbs./day for NO_X, ROG, $PM_{2.5}$ and PM_{10} (see **Table 1**). The six projects also included CO and SO_2 emissions using the same approach as used for the 41 hypothetical minor project analysis (see **Appendices B and D**). The ROG and PM emissions for the six projects were also speciated following the same approach as the hypothetical minor project modeling (see **Appendix D**). **Table C-2** displays the project emissions for the two levels of emissions used. Two levels of emissions were modeled in

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the project screening modeling to account for non-linear effects of ozone and secondary PM formation as a function of NO_X, ROG, SO_2 and CO emissions.

Table C-2. Emissions levels used for modeling strategic area projects at the six locations that are 2 and 8 times the threshold of significance.

Pollutant	Emissions (lbs./day)	
	2xTOS	8xTOS
NO_X	164	656
$PM_{2.5}$	164	656
ROG	164	656
SO_2	1.96	7.84
CO	524	2096

The ultimate goal of the strategic area screening analysis is to develop an interactive spreadsheet in which the user selects one of the six project locations and inputs the project total NO_X, $PM_{2.5}$ and VOC emissions. The spreadsheet internally interpolates the health effects from the CAMx/BenMAP modeling for each pollutant, and outputs a health effects summary table. If a user inputs any emissions value above the maximum emissions analyzed (see 8xTOS values in **Table C-2**), then the spreadsheet will output an error message. If the user inputs emissions below the minimum emissions analyzed (see 2xTOS values in **Table C-2**), then the spreadsheet will output the health effects corresponding to the 2xTOS scenario as a conservative estimate of the health effects.

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Two annual CAMx ozone and PM source apportionment model simulations were conducted for the 2012 calendar year using 2035 future year anthropogenic emissions: (1) six strategic area projects at 2xTOS emissions; and (2) six strategic area projects at 8xTOS emissions. Emissions from each of the six projects were tagged for treatment by the CAMx ozone (APCA) and PM (PSAT) source apportionment tool.

The CAMx source apportionment ozone and $PM_{2.5}$ contributions of each of the six projects at the two levels of emissions were input into BenMAP to obtain health effects, with results shown in **Appendix G**. BenMAP was run separately to obtain the ozone and $PM_{2.5}$ health effects from the project NO_X, ROG and PM emissions. For ozone, the following species mappings were used to attribute ozone (O_3) health effects to NO_X, ROG and PM precursor emissions.

- Ozone(NO_X) = O3N (ozone formed under NOx-limited conditions)
- Ozone(ROG) = O3V (ozone formed under VOC/ROG-limited conditions)
- Ozone(PM) = 0.0

For particulate matter, the following species mappings were used to attribute $PM_{2.5}$ health effects to NO_X, ROG and PM emissions:

- $PM_{2.5}$(NOx) = Nitrate (NO3) + Ammonium (NH4) + Sulfate (SO4)
- $PM_{2.5}$(ROG) = 0.0
- $PM_{2.5}$(PM) = Elemental Carbon (EC) + Primary Organic Aerosol (POA) + Other Fine Particulate (FPRM) + Fine Crustal Particulate (FCRS)

Note that the $PM_{2.5}$ associated with SO_4 is assigned to the project NO_X precursor emissions because the project SO_2 emissions were derived as a ratio to the NO_X emissions (see **Appendix D**). Particulate sulfate is expected to be a small component, as the SO_2 emissions in the six projects are only 1.2% of the NO_X emissions (see **Table C-2**).

The BenMAP results of the six strategic area project screening modeling at two emissions levels are provided in **Appendix G**.

C.1.2 Strategic Area Project Health Effects Screening Tool

The strategic area project screening modeling health effects were used to develop a Strategic Area Projects Health Effects Screening Tool, which is a spreadsheet that can be used to estimate health effects for potential strategic area projects with emissions below the 8xTOS level. The Strategic Area Project Health Effects Screening Tool has two interactive components that need to be defined by the user:

1. Project Location: Select one of the six strategic area project locations (see **Table C-1** and **Figure C-1**) from a dropdown menu, and the spreadsheet uses the strategic area project health effects screening modeling results for that location.
2. Project Emissions: Input the NO_X, ROG and $PM_{2.5}$ emissions in pounds/day for the potential strategic area project, and the tool linearly interpolates the ozone and PM health effects for the selected project location from the 2xTOS and 8xTOS CAMx/BenMAP modeling.

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Note that if the user inputs NO_X, ROG or PM emissions below the 2xTOS emissions rate, then the health effects for the 2xTOS emissions level are used to provide a conservative estimate of health effects. The assumption of linear interpolation of the ozone and PM health effects between the 2xTOS and 8xTOS CAMx/BenMAP modeling results could potentially introduce uncertainties in the results, if the linear assumption is invalid. The health effects concentration-response (C-R) functions used in BenMAP are most frequently expressed in log-linear relationships in concentration, so linear interpolation of the health effects between the 2xTOS and 8xTOS concentrations could introduce uncertainties. However, these are very low levels of concentrations, so the log-linear relationship of the C-R functions can be accurately represented by a linear relationship. The chemistry of ozone and secondary $PM_{2.5}$ formation is non-linear, so the use of linear interpolation of the NO_X and ROG health effects could introduce uncertainties in the results. Again, since we are analyzing very small changes in ozone and secondary $PM_{2.5}$ concentrations, the non-linear terms are negligible and small changes in the non-linear models can be correctly analyzed as linear, consistent with Taylor's theorem.[68] Furthermore, because we are interpolating between the 2xTOS and 8xTOS modeling scenarios (rather than extrapolating from one scenario), any non-linear effects in either the C-R functions or chemistry are bounded.

[68] https://mathinsight.org/taylors_theorem_multivariable_introduction

A CEQA project within the Sac Metro Air District or the 5-Air-District Region with 656 lbs/day or less of NOx, ROG and $PM_{2.5}$ emissions may use the Strategic Area Health Effects Screening Tool to provide an estimate of the health effects of the project. If the proposed project is within close proximity (e.g., within one 4-km grid cell) of one of the six strategic area source locations the proponent can discuss using the health effects from the Tool at that location with concurrence from the Sac Metro Air District or other applicable air district in the 5-Air-District Region.

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C.1.3 Using the Strategic Area Projects Health Effects Screening Tool Outside Strategic Areas

The strategic area projects health effects screening tool can be used outside of the strategic areas to provide a conservative (i.e., upper bound) estimate of health effects if the South Sacramento strategic area source is used as a surrogate location. The South Sacramento strategic area source was selected as a surrogate location because it has the highest population density within the 5-Air-District Region. Population density is the strongest driver of health effects. Consequently, the highest population density would be expected to have the largest population exposed and, as a result, the greatest number of health effects. The South Sacramento location is in the 4-km grid cell with the highest population and is also the grid cell centroid of a 3x3 array of 4-km grid cells with the highest population in the 5-Air-District Region; the 9-cells include the 4-km grid cells with the 1st, 2nd 3rd 4th 7th and 9th highest population grid cells in the 5-Air-District Region (see Figure C-2).

Because of the high population density, the South Sacramento location has the highest total health effects of the locations analyzed, out of the six strategic area source locations. For example, for a source with 656 lbs/day of NOx, ROG and $PM_{2.5}$, the premature mortality due to $PM_{2.5}$ across the 5-Air-District Region for the South Sacramento location is 26 deaths compared to 11, 17, 20, 2 and 2 deaths for the West Roseville, Rancho Cordova, Downtown Sacramento, Woodland and Vacaville strategic area locations, respectively.

Alternatively, the project proponent can conduct explicit photochemical grid and health effects modeling following the procedures in section 6 and Appendix A of this guidance.

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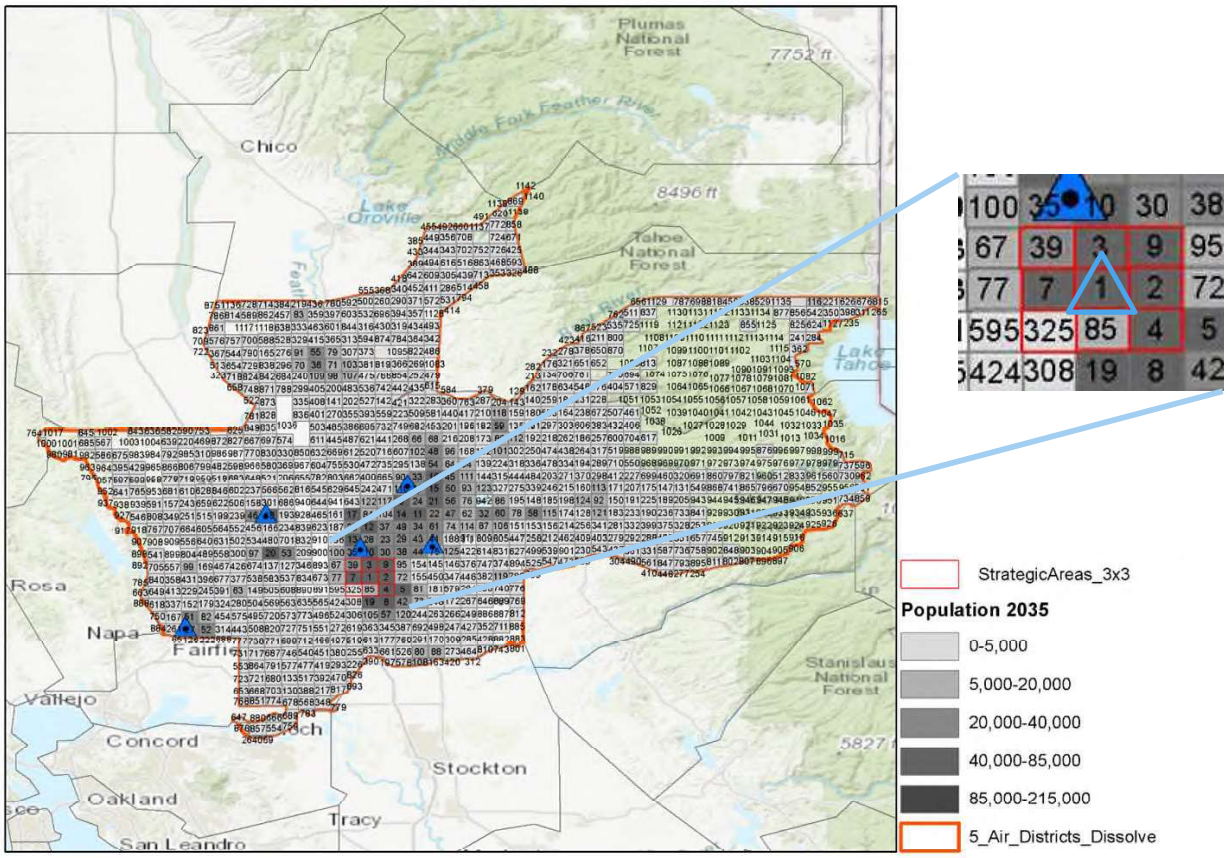
Figure C-2. Ranking of population in each 4-km grid cell within the 5-Air-District Region with magnified inset of highest population grid cells where the South Sacramento strategic area source is located.



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APPENDIX D
CHARACTERIZATION OF SO_2 AND CO EMISSIONS AND ROG CHEMICAL SPECIATION FOR TYPICAL PROJECT EMISSIONS

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CONT

D.1 ESTIMATE OF HYPOTHETICAL PROJECT SO_2 AND CO EMISSIONS

To characterize the approximate SO_2 and CO emissions that may result from emissions at the significance thresholds for $PM_{2.5}$, NO_X and VOCs, we analyzed six historical projects from Sacramento County. The projects were chosen as they represented a diversity of sources and were not dependent on a specific type of source.

To conduct the analysis, the Sac Metro Air District provided criteria pollutant emissions inventory information for the six projects. The information was for the years spanning 2013-2018, and therefore reflected practices and emissions profiles that are current. The emissions inventories were created using CalEEMod to be consistent with past and future projects occurring within the Sac Metro Air District.

Descriptions of these projects can be found in **Table D-1**. Descriptions are from the project description section of the development's CEQA document, which does not always match the CalEEMod land use inputs, also shown in **Table D-1**.

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Table D-1. Projects used to estimate the SO_2 and CO emissions ratios

Development	CEQA Project Document Descriptions	CalEEMod Inputs
Newbridge	• 1,095 acre mixed-use development • 3,135 Residential Units • 190,000 sq. ft. Commercial space, 180,000 sq. ft. Office space, 59.6 acres Recreational space, 9.4 acres Educational space	• 297.5 acres modeled • 880 Single Family Homes, 280 unit Low Rise Apartment • 120,000 sq. ft. Regional Shopping Center, 100 acre City Park, 1,000 student Elementary School
Panhandle	• 490 acre area to be annexed into Sacramento • 2,550 Residential Units and associated infrastructure	• Approx. 483 acres modeled • 2,660 Single Family Homes • 500 student Elementary School, 2800 student Junior High School, 57.8 acre City Park, 101,280 sq. ft. Regional Shopping Center
Richards Boulevard Office Complex	• 1.375 million GSF complex • Includes 1.225 million GSF workspace plus: lobbies, cafeterias, fitness center, auditorium, retail	• 1.437 million sq. ft. Government Office Building • 1,020 space Enclosed Parking with Elevator • 400 space Parking Lot
The Core	• 13 acre development • 300 unit luxury apartment complex with parking lot, utilities	• 11.7 acres modeled • 300 unit Mid Rise Apartment
Bilby Ridge	• Proposed annexation of 480 acre area • Description does not include a proposed new land use	• 17.57 acres modeled • 210,000 sq. ft. General Office Building, 110,000 sq. ft. Elementary School, 2.30 acre City Park, 345,000 sq. ft. Strip Mall
Cardoso	• 17.46 acre parcel of former agricultural land • 69 Single Family Homes to be built on 16.84 acres, remaining .62 acres for existing home	• 16.84 acres modeled • 69 Single Family Homes

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Overall emissions from the projects are provided in **Table D-2.** The allocated emissions are shown in **Tables D-3a-e. Table D-3f** shows the average percentage of emissions of each pollutant for each source type. These tables show that the great majority of SO_2 and CO emissions are associated with mobile sources. Accordingly, we chose to estimate SO_2 and CO emissions from the ratio of mobile-source NO_X emissions as mobile-source emissions are also the great majority of NO_X emissions.

Table D-2. Total emissions by project

Development	Emissions (tons/yr.)				
	ROG	NOx	CO	SO2	PM2.5
Newbridge	38.73	14.09	92.93	0.24	4.50
Panhandle	29.20	25.07	84.31	0.18	5.88
Richards Boulevard Office Complex	8.50	10.63	32.38	0.12	3.18
The Core	2.20	3.39	12.16	0.03	0.68
Bilby Ridge	8.29	19.63	50.30	0.12	2.51
Cardoso	0.80	0.98	3.20	0.01	0.19

Table D-3a. ROG - Percent of mitigated operational emissions attributed to each category by project

	Newbridge	Panhandle	Richards Blvd	The Core	Bilby Ridge	Cardoso
	Percentage of Operational Emissions (%)					
Architectural Coating	11.20	11.01	6.95	8.54	3.72	9.70
Consumer Products	64.78	70.43	66.46	53.30	31.34	60.55
Landscaping	1.36	4.11	0.04	4.27	0.01	2.70
Energy	0.47	0.11	0.85	0.72	0.41	1.20
Mobile	22.18	14.34	25.54	33.17	64.52	25.85
Stationary	0.00	0.00	0.16	0.00	0.00	0.00
Development Total (lbs./day)	212.21	160.01	46.57	12.04	45.43	4.39
Sac Metro Air District Significance Threshold (lbs./day)	65					

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CONT

Table D-3b. NOx - Percent of mitigated operational emissions attributed to each category by development

	Newbridge	Panhandle	Richards Blvd	The Core	Bilby Ridge	Cardoso
	Percentage of Operational Emissions (%)					
Architectural Coating	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping	1.43	1.84	0.00	1.06	0.00	0.84
Energy	11.20	1.16	6.21	3.98	1.58	8.35
Mobile	87.37	97.00	93.23	94.97	98.42	90.81
Stationary	0.00	0.00	0.56	0.00	0.00	0.00
Development Total (lbs./day)	77.20	137.39	58.23	18.57	107.57	5.39
Sac Metro Air District Significance Threshold (lbs./day)	65					

Table D-3c. CO - Percent of mitigated operational emissions attributed to each category by development

	Newbridge	Panhandle	Richards Blvd	The Core	Bilby Ridge	Cardoso
	Percentage of Operational Emissions (%)					
Architectural Coating	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping	18.82	47.41	0.11	25.49	0.02	22.26
Energy	0.77	0.29	1.71	0.47	0.52	1.09
Mobile	80.41	52.30	98.07	74.04	99.46	76.64
Stationary	0.00	0.00	0.10	0.00	0.00	0.00
Development Total (lbs./day)	509.21	462.00	177.43	66.65	275.60	17.55
Sac Metro Air District Significance Threshold (lbs./day)	N/A					

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CONT

Table D-3d. SO2 - Percent of mitigated operational emissions attributed to each category by development

	Newbridge	Panhandle	Richards Blvd	The Core	Bilby Ridge	Cardoso
	Percentage of Operational Emissions (%)					
Architectural Coating	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping	0.39	1.18	0.00	0.56	0.00	0.47
Energy	4.19	0.97	3.22	2.98	1.59	6.07
Mobile	95.42	97.85	96.73	96.46	98.41	93.47
Stationary	0.00	0.00	0.05	0.00	0.00	0.00
Development Total (lbs./day)	1.31	0.99	0.67	0.16	0.64	0.05
Sac Metro Air District Significance Threshold (lbs./day)	N/A					

Table D-3e. PM2.5- Percent of mitigated operational emissions attributed to each category by development

	Newbridge	Panhandle	Richards Blvd	The Core	Bilby Ridge	Cardoso
	Percentage of Operational Emissions (%)					
Architectural Coating (Total)	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products (Total)	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping (Total)	2.15	3.78	0.00	2.50	0.00	2.12
Energy (Total)	2.83	0.38	1.58	1.59	0.94	3.58
Mobile (Fugitive)	90.26	94.29	95.73	92.51	93.47	90.92
Mobile (Exhaust)	4.76	1.55	2.63	3.40	5.59	3.38
Stationary (Total)	0.00	0.00	0.06	0.00	0.00	0.00
Development Total (lbs./day)	24.63	32.24	17.43	3.75	13.75	1.02
SMAQMD Significance Threshold (lbs./day)	82					

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CONT

Table D-3f. Emissions summary for all pollutants for all projects with average percentages of emissions

	ROG			NOx			CO			SO2			PM2.5 Total		
	Avg	Min	Max	**Avg**	Min	Max	**Avg**	Min	Max	**Avg**	Min	Max	**Avg**	Min	Max
	%			%			%			%			%		
Architectural Coating	**8.52**	3.72	11.20	**0.00**	0.00	0.00	**0.00**	0.00	0.00	**0.00**	0.00	0.00	**0.00**	0.00	0.00
Consumer Products	**57.81**	31.34	70.43	**0.00**	0.00	0.00	**0.00**	0.00	0.00	**0.00**	0.00	0.00	**0.00**	0.00	0.00
Landscaping	**2.08**	0.01	4.27	**0.86**	0.00	1.84	**19.02**	0.02	47.41	**0.43**	0.00	1.18	**1.76**	0.00	3.78
Energy	**0.63**	0.11	1.20	**5.41**	1.16	11.20	**0.81**	0.29	1.71	**3.17**	0.97	6.07	**1.82**	0.38	3.58
Mobile (Total)	**30.93**	14.34	64.52	**93.63**	87.37	98.42	**80.15**	52.30	99.46	**96.39**	93.47	98.41	--	--	--
Mobile (Fugitive)	**--**	--	--	--	--	--	--	--	--	--	--	--	**92.86**	90.26	95.73
Mobile (Exhaust)	--	--	--	--	--	--	--	--	--	--	--	--	**3.55**	1.55	5.59
Stationary	**0.03**	0.00	0.16	**0.09**	0.00	0.56	**0.02**	0.00	0.10	**0.01**	0.00	0.05	**0.01**	0.00	0.06

The ratios of emissions of SO_2 and CO to NO_X is shown in **Table D-4**, below.

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Table D-4. Ratio of CO/NOx and SO2/NOx

Source Category	Newbridge		Panhandle		Richards Boulevard		The Core		Bilby Ridge		Cardoso	
	CO/NOx	**SO2/NOx**	**CO/NOx**	**SO2/NOx**	**CO/NOx**	**SO2/NOx**	**CO/NOx**	**SO2/NOx**	**CO/NOx**	**SO2/NOx**	**CO/NOx**	**SO2/NOx**
	Unitless (ratio)											
Architectural Coating	--	--	--	--	--	--	--	--	--	--	--	--
Consumer Products	--	--	--	--	--	--	--	--	--	--	--	--
Landscaping	86.7711	0.0046	86.7080	0.0046	110.3030	0.0000	86.6061	0.0045	107.5000	0.0000	86.6464	0.0049
Energy	0.4515	0.0064	0.8400	0.0060	0.8400	0.0060	0.4251	0.0064	0.8401	0.0060	0.4263	0.0063
Mobile	6.0703	0.0185	1.8130	0.0072	3.2051	0.0120	2.7985	0.0086	2.5892	0.0059	2.7488	0.0090
Stationary	--	--	--	--	0.5702	0.0010	--	--	--	--	--	--
Total	6.5958	0.0170	3.3626	0.0072	3.0469	0.0116	3.5894	0.0085	2.5620	0.0059	3.2571	0.0087

The ratio of CO to NO_X for mobile sources varied from a high of 6.07 to a low of 1.81, with many clustered between 2.5 and 3.2. We chose a ratio of 3.2 to be conservative and decided on a default value of 3.2 x 82, or 262 lbs. CO/day. The ratio of SO_2 to NO_X varies for mobile sources from a high of 0.0185 to a low of 0.0059, with most between 0.072 to 0.0090. We chose the second highest value of 0.012 to be conservative and decided on a default value of 0.012 times 82, or 0.98 lbs. SO_2/day.

D.2 CHEMICAL SPECIATION FOR HYPOTHETICAL PROJECT ROG AND PM EMISSIONS

In addition to specifying the hypothetical project primary $PM_{2.5}$, PM_{10} and ROG emissions, the user needs to chemically speciate these emissions into the individual components used in the CAMx chemical mechanism. Primary $PM_{2.5}$ and PM_{10} are chemically inert, and the concentration-response functions selected for use in the BenMAP health effects model use only the total $PM_{2.5}$ mass concentrations and don't differentiate health effects across different PM species (e.g., elemental carbon, organic aerosol and other fine particulate). Thus, it doesn't matter how the hypothetical project PM emissions are speciated, and for this reason, all the hypothetical project $PM_{2.5}$ emissions were speciated as the CAMx fine particulate matter (FPRM) species.

The speciation of the hypothetical project ROG emissions, however, is important, as the different ROG individual species in the SAPRC07 chemical mechanism used in the BAAQMD CAMx 2012 modeling database have different chemical reactivities and ozone formation potentials. The hypothetical project ROG emissions are speciated into the SAPRC07 chemical mechanism using the SMOKE emissions model that allocates the ROG emissions to SAPRC07 species using chemical speciation profiles from EPA's SPECIATE database[69]. SMOKE cross-references SPECIATE chemical speciation profiles to source emission types using SCCs. To determine the types of sources with ROG emissions for a typical CEQA project in the Sac Metro Air District planning area, we examined the percent contribution of ROG emissions for the same six projects that are discussed above and shown in **Table D-3a**. Ignoring the Bilby Ridge Project, which is an outlier among the six projects, we found that the following three source categories contributed 95-99% of the ROG emissions, so we assumed the following ROG contributions for these three source categories, with the SCCs in parenthesis and the ranges across the five projects in brackets:

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- Consumer Products (2460000000) = 65% [53% - 70%]
- Mobile Sources (220110111B) = 25% [14% - 33%]
- Architectural Coatings (241001000) = 10% [7% - 11%]

The SMOKE emissions model was used with the SCC codes listed above to chemically speciate the hypothetical project ROG emissions into the SAPRC07 chemical species.

[69] https://www.epa.gov/air-emissions-modeling/speciate

APPENDIX E
SAMPLE SCC CODES TYPICALLY USED IN CEQA PROJECTS

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CONT

E.1 APPENDIX E

Table E-1. Example SCCs frequently used to characterize CEQA Project emission source types

Emission Source	SCC	SCC Description
Architectural Coatings	2401001000	Solvent Utilization; Surface Coating; Architectural Coatings; Total: All Solvent Types
Construction Off-road Equipment	2270002000	Mobile Sources; Off-highway Vehicle Diesel; Construction and Mining Equipment; Total
Consumer Products	2460000000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Processes; Total: All Solvent Types
Consumer Products	2460100000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Personal Care Products; Total: All Solvent Types
Consumer Products	2460200000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Household Products; Total: All Solvent Types
Consumer Products	2460400000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Automotive Aftermarket Products; Total: All Solvent Types
Consumer Products	2460500000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Coatings and Related Products; Total: All Solvent Types
Consumer Products	2460600000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All Adhesives and Sealants; Total: All Solvent Types
Consumer Products	2460800000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; All FIFRA Related Products; Total: All Solvent Types
Consumer Products	2460900000	Solvent Utilization; Miscellaneous Non-industrial: Consumer and Commercial; Miscellaneous Products (Not Otherwise Covered); Total: All Solvent Types
Energy (Stationary Engines)	20200102	Internal Combustion Engines; Industrial; Distillate Oil (Diesel);Reciprocating
Energy (Natural Gas)	2102006000	Stationary Source Fuel Combustion; Industrial; Natural Gas; Total: Boilers and IC Engines
Marine Vessels (Ferries)	2280002010	Mobile Sources; Marine Vessels, Commercial; Diesel; Ocean-going Vessels
Mobile	220100111B	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Vehicles (LDGV);Rural[70] Interstate: Brake Wear
Mobile	220100111R	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Vehicles (LDGV); Rural Interstate: Resting Loss

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[70] Rural and Urban mobile designations provide equivalent chemical speciation and temporal distributions, as the EMFAC mobile emissions model does not distinguish between the two.

Table E-1. Example SCCs frequently used to characterize CEQA Project emission source types

Emission Source	SCC	SCC Description
Mobile	220100111S	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Vehicles (LDGV); Rural Interstate: Start
Mobile	220100111T	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Vehicles (LDGV);Rural Interstate: Tire Wear
Mobile	220100111V	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Vehicles (LDGV);Rural Interstate: Evap (except Refueling)
Mobile	220100111X	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Vehicles (LDGV); Rural Interstate: Exhaust
Mobile	220102011B	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5); Rural Interstate: Brake Wear
Mobile	220102011R	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5); Rural Interstate: Resting Loss
Mobile	220102011S	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5); Rural Interstate: Start
Mobile	220102011T	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5); Rural Interstate: Tire Wear
Mobile	220102011V	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5); Rural Interstate: Evap (except Refueling)
Mobile	220102011X	Mobile Sources; Highway Vehicles - Gasoline; Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5); Rural Interstate: Exhaust
Mobile	2201070110	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV);Rural Interstate: Total
Mobile	220107011B	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Interstate: Brake Wear
Mobile	220107011I	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 2B; Rural Interstate: Idling
Mobile	220107011R	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Interstate: Resting Loss
Mobile	220107011S	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Interstate: Start
Mobile	220107011T	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Interstate: Tire Wear
Mobile	220107011V	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Interstate: Evap (except Refueling)
Mobile	220107011X	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Interstate: Exhaust
Mobile	2201070130	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Other Principal Arterial: Total

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CONT

Table E-1. Example SCCs frequently used to characterize CEQA Project emission source types

Emission Source	SCC	SCC Description
Mobile	220107013B	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Other Principal Arterial: Brake Wear
Mobile	220107013I	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Other Principal Arterial: Idling
Mobile	220107013R	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Other Principal Arterial: Resting Loss
Mobile	220107013S	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Other Principal Arterial: Start
Mobile	220107013T	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Other Principal Arterial: Tire Wear
Mobile	220107013V	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Other Principal Arterial: Evap (except Refueling)
Mobile	220107013X	Mobile Sources; Highway Vehicles - Gasoline; Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV); Rural Other Principal Arterial: Exhaust
Mobile	220108011B	Mobile Sources; Highway Vehicles - Gasoline; Motorcycles (MC); Rural Interstate: Brake Wear
Mobile	220108011R	Mobile Sources; Highway Vehicles - Gasoline; Motorcycles (MC); Rural Interstate: Resting Loss
Mobile	220108011S	Mobile Sources; Highway Vehicles - Gasoline; Motorcycles (MC); Rural Interstate: Start
Mobile	220108011T	Mobile Sources; Highway Vehicles - Gasoline; Motorcycles (MC); Rural Interstate: Tire Wear
Mobile	220108011V	Mobile Sources; Highway Vehicles - Gasoline; Motorcycles (MC); Rural Interstate: Evap (except Refueling)
Mobile	220108011X	Mobile Sources; Highway Vehicles - Gasoline; Motorcycles (MC); Rural Interstate: Exhaust
Mobile	223000111B	Mobile Sources; Highway Vehicles - Diesel; Light Duty Diesel Vehicles (LDDV); Rural Interstate: Brake Wear
Mobile	223000111T	Mobile Sources; Highway Vehicles - Diesel; Light Duty Diesel Vehicles (LDDV); Rural Interstate: Tire Wear
Mobile	223000111X	Mobile Sources; Highway Vehicles - Diesel; Light Duty Diesel Vehicles (LDDV); Rural Interstate: Exhaust
Mobile	223006011B	Mobile Sources; Highway Vehicles - Diesel; Light Duty Diesel Trucks 1 thru 4 (M6) (LDDT); Rural Interstate: Brake Wear
Mobile	223006011T	Mobile Sources; Highway Vehicles - Diesel; Light Duty Diesel Trucks 1 thru 4 (M6) (LDDT); Rural Interstate: Tire Wear

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CONT

Table E-1. Example SCCs frequently used to characterize CEQA Project emission source types

Emission Source	SCC	SCC Description
Mobile	223006011X	Mobile Sources; Highway Vehicles - Diesel; Light Duty Diesel Trucks 1 thru 4 (M6) (LDDT); Rural Interstate: Exhaust
Mobile	223007111B	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 2B; Rural Interstate: Brake Wear
Mobile	223007111I	Mobile Sources; Highway Vehicles – Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 2B; Rural Interstate: Idling
Mobile	223007111T	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 2B; Rural Interstate: Tire Wear
Mobile	223007111X	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 2B; Rural Interstate: Exhaust
Mobile	2230072110	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 3, 4, & 5; Rural Interstate: Total
Mobile	223007211B	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 3, 4, & 5; Rural Interstate: Brake Wear
Mobile	223007211I	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 3, 4, & 5; Rural Interstate: Idling
Mobile	223007211T	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 3, 4, & 5; Rural Interstate: Tire Wear
Mobile	223007211X	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 3, 4, & 5; Rural Interstate: Exhaust
Mobile	223007311B	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 6 & 7; Rural Interstate: Brake Wear
Mobile	223007311I	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 6 & 7; Rural Interstate: Idling
Mobile	223007311S	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 6 & 7; Rural Interstate: Start
Mobile	223007311T	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 6 & 7; Rural Interstate: Tire Wear
Mobile	223007311X	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Vehicles (HDDV) Class 6 & 7; Rural Interstate: Exhaust
Mobile	223007513B	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Buses (School & Transit); Rural Other Principal Arterial: Brake Wear
Mobile	223007513I	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Buses (School & Transit); Rural Other Principal Arterial: Idling
Mobile	223007513S	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Buses (School & Transit); Rural Other Principal Arterial: Start
Mobile	223007513T	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Buses (School & Transit); Rural Other Principal Arterial: Tire Wear

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CONT

Table E-1. Example SCCs frequently used to characterize CEQA Project emission source types

Emission Source	SCC	SCC Description
Mobile	223007513X	Mobile Sources; Highway Vehicles - Diesel; Heavy Duty Diesel Buses (School & Transit); Rural Other Principal Arterial: Exhaust
Mobile	2294000000	Mobile Sources; Paved Roads; All Paved Roads; Total: Fugitives
Waste Water Treatment Plant	2630010000	Waste Disposal, Treatment, and Recovery; Wastewater Treatment; Industrial; Total Processed

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CONT

APPENDIX F
BENMAP HEALTH EFFECTS RESULTS FOR THE 41 HYPOTHETICAL SOURCES USED IN THE MINOR PROJECTS

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CONT

Appendix F: BenMAP Health Effects Results for the 41 Hypothetical Sources used in the Minor Project Screening Modeling in Appendix B

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
1	PM2.5	Emergency Room Visits, Asthma	0 - 99	3.01E-02
1	PM2.5	Mortality, All Cause	30 - 99	1.10E-01
1	PM2.5	Hospital Admissions, Asthma	0 - 64	2.04E-03
1	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	6.65E-03
1	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.77E-02
1	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	3.01E-06
1	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	2.18E-04
1	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	4.43E-04
1	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	8.35E-04
1	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	3.57E-03
1	O3	Hospital Admissions, All Respiratory	65 - 99	9.91E-03
1	O3	Mortality, Non-Accidental	0 - 99	5.63E-03
1	O3	Emergency Room Visits, Asthma	0 - 17	2.84E-02
1	O3	Emergency Room Visits, Asthma	18 - 99	5.38E-02
2	PM2.5	Emergency Room Visits, Asthma	0 - 99	5.41E-02
2	PM2.5	Mortality, All Cause	30 - 99	1.22E-01
2	PM2.5	Hospital Admissions, Asthma	0 - 64	3.10E-03
2	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	7.56E-03
2	PM2.5	Hospital Admissions, All Respiratory	65 - 99	2.06E-02
2	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	5.04E-06
2	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	3.33E-04
2	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	5.67E-04
2	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	8.40E-04
2	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	3.81E-03
2	O3	Hospital Admissions, All Respiratory	65 - 99	1.07E-02
2	O3	Mortality, Non-Accidental	0 - 99	5.90E-03
2	O3	Emergency Room Visits, Asthma	0 - 17	3.53E-02

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
2	O3	Emergency Room Visits, Asthma	18 - 99	6.37E-02
3	PM2.5	Emergency Room Visits, Asthma	0 - 99	3.55E-02
3	PM2.5	Mortality, All Cause	30 - 99	1.01E-01
3	PM2.5	Hospital Admissions, Asthma	0 - 64	2.27E-03
3	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	6.53E-03
3	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.74E-02
3	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	3.14E-06
3	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	2.31E-04
3	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	4.44E-04
3	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	6.97E-04
3	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	3.33E-03
3	O3	Hospital Admissions, All Respiratory	65 - 99	9.96E-03
3	O3	Mortality, Non-Accidental	0 - 99	5.51E-03
3	O3	Emergency Room Visits, Asthma	0 - 17	3.26E-02
3	O3	Emergency Room Visits, Asthma	18 - 99	5.86E-02
4	PM2.5	Emergency Room Visits, Asthma	0 - 99	3.15E-02
4	PM2.5	Mortality, All Cause	30 - 99	1.00E-01
4	PM2.5	Hospital Admissions, Asthma	0 - 64	1.93E-03
4	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	7.08E-03
4	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.79E-02
4	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	2.77E-06
4	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.94E-04
4	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	4.53E-04
4	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	7.37E-04
4	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	3.78E-03
4	O3	Hospital Admissions, All Respiratory	65 - 99	9.85E-03
4	O3	Mortality, Non-Accidental	0 - 99	5.43E-03
4	O3	Emergency Room Visits, Asthma	0 - 17	3.36E-02
4	O3	Emergency Room Visits, Asthma	18 - 99	5.82E-02

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
5	PM2.5	Emergency Room Visits, Asthma	0 - 99	9.43E-02
5	PM2.5	Mortality, All Cause	30 - 99	3.59E-01
5	PM2.5	Hospital Admissions, Asthma	0 - 64	4.93E-03
5	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	2.39E-02
5	PM2.5	Hospital Admissions, All Respiratory	65 - 99	6.10E-02
5	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	7.99E-06
5	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	4.94E-04
5	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	1.24E-03
5	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	2.16E-03
5	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	1.26E-02
5	O3	Hospital Admissions, All Respiratory	65 - 99	1.84E-02
5	O3	Mortality, Non-Accidental	0 - 99	1.03E-02
5	O3	Emergency Room Visits, Asthma	0 - 17	6.22E-02
5	O3	Emergency Room Visits, Asthma	18 - 99	1.07E-01
6	PM2.5	Emergency Room Visits, Asthma	0 - 99	1.12E-01
6	PM2.5	Mortality, All Cause	30 - 99	4.76E-01
6	PM2.5	Hospital Admissions, Asthma	0 - 64	6.24E-03
6	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	2.93E-02
6	PM2.5	Hospital Admissions, All Respiratory	65 - 99	7.41E-02
6	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	1.07E-05
6	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	6.41E-04
6	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	1.67E-03
6	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	2.83E-03
6	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	1.56E-02
6	O3	Hospital Admissions, All Respiratory	65 - 99	2.27E-02
6	O3	Mortality, Non-Accidental	0 - 99	1.31E-02
6	O3	Emergency Room Visits, Asthma	0 - 17	7.54E-02
6	O3	Emergency Room Visits, Asthma	18 - 99	1.30E-01
7	PM2.5	Emergency Room Visits, Asthma	0 - 99	1.98E-01
7	PM2.5	Mortality, All Cause	30 - 99	9.85E-01

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
7	PM2.5	Hospital Admissions, Asthma	0 - 64	1.06E-02
7	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	5.76E-02
7	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.47E-01
7	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	1.92E-05
7	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.10E-03
7	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	2.83E-03
7	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	5.19E-03
7	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	3.04E-02
7	O3	Hospital Admissions, All Respiratory	65 - 99	3.72E-02
7	O3	Mortality, Non-Accidental	0 - 99	2.20E-02
7	O3	Emergency Room Visits, Asthma	0 - 17	1.07E-01
7	O3	Emergency Room Visits, Asthma	18 - 99	1.93E-01
8	PM2.5	Emergency Room Visits, Asthma	0 - 99	1.35E-01
8	PM2.5	Mortality, All Cause	30 - 99	5.72E-01
8	PM2.5	Hospital Admissions, Asthma	0 - 64	7.89E-03
8	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	3.47E-02
8	PM2.5	Hospital Admissions, All Respiratory	65 - 99	8.63E-02
8	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	1.29E-05
8	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	8.57E-04
8	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	1.95E-03
8	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	3.29E-03
8	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	1.83E-02
8	O3	Hospital Admissions, All Respiratory	65 - 99	2.68E-02
8	O3	Mortality, Non-Accidental	0 - 99	1.60E-02
8	O3	Emergency Room Visits, Asthma	0 - 17	8.34E-02
8	O3	Emergency Room Visits, Asthma	18 - 99	1.45E-01
9	PM2.5	Emergency Room Visits, Asthma	0 - 99	2.94E-01
9	PM2.5	Mortality, All Cause	30 - 99	1.26E+00
9	PM2.5	Hospital Admissions, Asthma	0 - 64	1.64E-02

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
9	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	7.51E-02
9	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.85E-01
9	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	2.90E-05
9	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.84E-03
9	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	4.33E-03
9	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	7.33E-03
9	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	4.05E-02
9	O3	Hospital Admissions, All Respiratory	65 - 99	4.81E-02
9	O3	Mortality, Non-Accidental	0 - 99	2.97E-02
9	O3	Emergency Room Visits, Asthma	0 - 17	1.28E-01
9	O3	Emergency Room Visits, Asthma	18 - 99	2.34E-01
10	PM2.5	Emergency Room Visits, Asthma	0 - 99	1.28E-01
10	PM2.5	Mortality, All Cause	30 - 99	6.45E-01
10	PM2.5	Hospital Admissions, Asthma	0 - 64	7.55E-03
10	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	3.64E-02
10	PM2.5	Hospital Admissions, All Respiratory	65 - 99	9.51E-02
10	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	1.25E-05
10	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	8.27E-04
10	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	1.66E-03
10	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	2.74E-03
10	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	1.80E-02
10	O3	Hospital Admissions, All Respiratory	65 - 99	1.94E-02
10	O3	Mortality, Non-Accidental	0 - 99	1.15E-02
10	O3	Emergency Room Visits, Asthma	0 - 17	6.20E-02
10	O3	Emergency Room Visits, Asthma	18 - 99	1.08E-01
11	PM2.5	Emergency Room Visits, Asthma	0 - 99	4.60E-02
11	PM2.5	Mortality, All Cause	30 - 99	1.76E-01
11	PM2.5	Hospital Admissions, Asthma	0 - 64	2.81E-03
11	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.11E-02

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
11	PM2.5	Hospital Admissions, All Respiratory	65 - 99	2.74E-02
11	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	4.22E-06
11	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	3.00E-04
11	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	6.77E-04
11	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	1.12E-03
11	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	5.92E-03
11	O3	Hospital Admissions, All Respiratory	65 - 99	1.20E-02
11	O3	Mortality, Non-Accidental	0 - 99	6.99E-03
11	O3	Emergency Room Visits, Asthma	0 - 17	3.82E-02
11	O3	Emergency Room Visits, Asthma	18 - 99	6.69E-02
12	PM2.5	Emergency Room Visits, Asthma	0 - 99	1.13E-01
12	PM2.5	Mortality, All Cause	30 - 99	4.23E-01
12	PM2.5	Hospital Admissions, Asthma	0 - 64	6.86E-03
12	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	2.68E-02
12	PM2.5	Hospital Admissions, All Respiratory	65 - 99	6.39E-02
12	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	1.01E-05
12	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	7.53E-04
12	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	1.71E-03
12	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	2.81E-03
12	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	1.44E-02
12	O3	Hospital Admissions, All Respiratory	65 - 99	1.94E-02
12	O3	Mortality, Non-Accidental	0 - 99	1.16E-02
12	O3	Emergency Room Visits, Asthma	0 - 17	6.42E-02
12	O3	Emergency Room Visits, Asthma	18 - 99	1.10E-01
13	PM2.5	Emergency Room Visits, Asthma	0 - 99	2.31E-01
13	PM2.5	Mortality, All Cause	30 - 99	9.25E-01
13	PM2.5	Hospital Admissions, Asthma	0 - 64	1.41E-02
13	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	5.78E-02
13	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.36E-01
13	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	2.13E-05

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
13	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.59E-03
13	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	3.57E-03
13	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	5.82E-03
13	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	3.08E-02
13	O3	Hospital Admissions, All Respiratory	65 - 99	3.88E-02
13	O3	Mortality, Non-Accidental	0 - 99	2.46E-02
13	O3	Emergency Room Visits, Asthma	0 - 17	1.02E-01
13	O3	Emergency Room Visits, Asthma	18 - 99	1.86E-01
14	PM2.5	Emergency Room Visits, Asthma	0 - 99	4.77E-01
14	PM2.5	Mortality, All Cause	30 - 99	1.38E+00
14	PM2.5	Hospital Admissions, Asthma	0 - 64	3.00E-02
14	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	9.63E-02
14	PM2.5	Hospital Admissions, All Respiratory	65 - 99	2.05E-01
14	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	4.05E-05
14	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	3.74E-03
14	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	8.14E-03
14	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	1.26E-02
14	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	5.61E-02
14	O3	Hospital Admissions, All Respiratory	65 - 99	5.29E-02
14	O3	Mortality, Non-Accidental	0 - 99	3.33E-02
14	O3	Emergency Room Visits, Asthma	0 - 17	1.53E-01
14	O3	Emergency Room Visits, Asthma	18 - 99	2.74E-01
15	PM2.5	Emergency Room Visits, Asthma	0 - 99	8.92E-01
15	PM2.5	Mortality, All Cause	30 - 99	2.52E+00
15	PM2.5	Hospital Admissions, Asthma	0 - 64	5.63E-02
15	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	2.08E-01
15	PM2.5	Hospital Admissions, All Respiratory	65 - 99	3.81E-01
15	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	7.24E-05
15	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	6.31E-03
15	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	1.69E-02

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
15	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	2.87E-02
15	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	1.31E-01
15	O3	Hospital Admissions, All Respiratory	65 - 99	8.99E-02
15	O3	Mortality, Non-Accidental	0 - 99	5.73E-02
15	O3	Emergency Room Visits, Asthma	0 - 17	3.32E-01
15	O3	Emergency Room Visits, Asthma	18 - 99	5.85E-01
16	PM2.5	Emergency Room Visits, Asthma	0 - 99	6.58E-01
16	PM2.5	Mortality, All Cause	30 - 99	2.61E+00
16	PM2.5	Hospital Admissions, Asthma	0 - 64	3.53E-02
16	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.50E-01
16	PM2.5	Hospital Admissions, All Respiratory	65 - 99	3.70E-01
16	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	7.02E-05
16	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	4.34E-03
16	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	8.91E-03
16	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	1.41E-02
16	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	8.15E-02
16	O3	Hospital Admissions, All Respiratory	65 - 99	8.04E-02
16	O3	Mortality, Non-Accidental	0 - 99	5.12E-02
16	O3	Emergency Room Visits, Asthma	0 - 17	2.26E-01
16	O3	Emergency Room Visits, Asthma	18 - 99	4.05E-01
17	PM2.5	Emergency Room Visits, Asthma	0 - 99	4.66E-01
17	PM2.5	Mortality, All Cause	30 - 99	1.22E+00
17	PM2.5	Hospital Admissions, Asthma	0 - 64	2.96E-02
17	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.01E-01
17	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.91E-01
17	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	3.62E-05
17	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	3.37E-03
17	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	8.43E-03
17	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	1.50E-02
17	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	6.24E-02

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
17	O3	Hospital Admissions, All Respiratory	65 - 99	4.86E-02
17	O3	Mortality, Non-Accidental	0 - 99	3.04E-02
17	O3	Emergency Room Visits, Asthma	0 - 17	1.69E-01
17	O3	Emergency Room Visits, Asthma	18 - 99	2.90E-01
18	PM2.5	Emergency Room Visits, Asthma	0 - 99	7.78E-01
18	PM2.5	Mortality, All Cause	30 - 99	1.60E+00
18	PM2.5	Hospital Admissions, Asthma	0 - 64	5.15E-02
18	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.32E-01
18	PM2.5	Hospital Admissions, All Respiratory	65 - 99	2.44E-01
18	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	6.50E-05
18	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	5.86E-03
18	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	1.50E-02
18	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	2.35E-02
18	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	8.34E-02
18	O3	Hospital Admissions, All Respiratory	65 - 99	5.29E-02
18	O3	Mortality, Non-Accidental	0 - 99	3.28E-02
18	O3	Emergency Room Visits, Asthma	0 - 17	2.28E-01
18	O3	Emergency Room Visits, Asthma	18 - 99	3.72E-01
19	PM2.5	Emergency Room Visits, Asthma	0 - 99	7.04E-01
19	PM2.5	Mortality, All Cause	30 - 99	1.33E+00
19	PM2.5	Hospital Admissions, Asthma	0 - 64	4.53E-02
19	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.13E-01
19	PM2.5	Hospital Admissions, All Respiratory	65 - 99	2.19E-01
19	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	5.61E-05
19	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	5.01E-03
19	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	1.23E-02
19	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	1.99E-02
19	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	7.06E-02
19	O3	Hospital Admissions, All Respiratory	65 - 99	3.55E-02
19	O3	Mortality, Non-Accidental	0 - 99	2.06E-02

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
19	O3	Emergency Room Visits, Asthma	0 - 17	1.82E-01
19	O3	Emergency Room Visits, Asthma	18 - 99	2.68E-01
20	PM2.5	Emergency Room Visits, Asthma	0 - 99	1.46E+00
20	PM2.5	Mortality, All Cause	30 - 99	2.29E+00
20	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	9.71E-02
20	PM2.5	Hospital Admissions, Asthma	0 - 64	1.86E-01
20	PM2.5	Hospital Admissions, All Respiratory	65 - 99	3.37E-01
20	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	1.31E-04
20	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.23E-02
20	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	2.49E-02
20	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	3.98E-02
20	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	1.19E-01
20	O3	Hospital Admissions, All Respiratory	65 - 99	8.52E-02
20	O3	Mortality, Non-Accidental	0 - 99	5.28E-02
20	O3	Emergency Room Visits, Asthma	0 - 17	4.61E-01
20	O3	Emergency Room Visits, Asthma	18 - 99	7.24E-01
21	PM2.5	Emergency Room Visits, Asthma	0 - 99	4.42E-01
21	PM2.5	Mortality, All Cause	30 - 99	1.27E+00
21	PM2.5	Hospital Admissions, Asthma	0 - 64	2.63E-02
21	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	5.48E-02
21	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.59E-01
21	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	6.22E-05
21	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	2.83E-03
21	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	5.19E-03
21	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	7.77E-03
21	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	3.43E-02
21	O3	Hospital Admissions, All Respiratory	65 - 99	5.45E-02
21	O3	Mortality, Non-Accidental	0 - 99	3.38E-02
21	O3	Emergency Room Visits, Asthma	0 - 17	2.80E-01

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
21	O3	Emergency Room Visits, Asthma	18 - 99	4.39E-01
22	PM2.5	Emergency Room Visits, Asthma	0 - 99	1.72E-01
22	PM2.5	Mortality, All Cause	30 - 99	4.25E-01
22	PM2.5	Hospital Admissions, Asthma	0 - 64	1.00E-02
22	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	2.60E-02
22	PM2.5	Hospital Admissions, All Respiratory	65 - 99	6.42E-02
22	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	1.86E-05
22	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	9.72E-04
22	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	2.20E-03
22	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	3.51E-03
22	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	1.51E-02
22	O3	Hospital Admissions, All Respiratory	65 - 99	4.21E-02
22	O3	Mortality, Non-Accidental	0 - 99	2.44E-02
22	O3	Emergency Room Visits, Asthma	0 - 17	2.06E-01
22	O3	Emergency Room Visits, Asthma	18 - 99	3.36E-01
23	PM2.5	Emergency Room Visits, Asthma	0 - 99	4.58E-01
23	PM2.5	Mortality, All Cause	30 - 99	1.33E+00
23	PM2.5	Hospital Admissions, Asthma	0 - 64	2.55E-02
23	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	5.81E-02
23	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.69E-01
23	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	1.43E-04
23	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	2.58E-03
23	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	4.87E-03
23	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	7.54E-03
23	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	3.64E-02
23	O3	Hospital Admissions, All Respiratory	65 - 99	5.98E-02
23	O3	Mortality, Non-Accidental	0 - 99	3.73E-02
23	O3	Emergency Room Visits, Asthma	0 - 17	3.06E-01
23	O3	Emergency Room Visits, Asthma	18 - 99	4.87E-01

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
24	PM2.5	Emergency Room Visits, Asthma	0 - 99	1.09E+00
24	PM2.5	Mortality, All Cause	30 - 99	2.38E+00
24	PM2.5	Hospital Admissions, Asthma	0 - 64	7.13E-02
24	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.94E-01
24	PM2.5	Hospital Admissions, All Respiratory	65 - 99	3.57E-01
24	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	9.32E-05
24	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	7.90E-03
24	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	2.02E-02
24	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	3.35E-02
24	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	1.24E-01
24	O3	Hospital Admissions, All Respiratory	65 - 99	9.10E-02
24	O3	Mortality, Non-Accidental	0 - 99	5.68E-02
24	O3	Emergency Room Visits, Asthma	0 - 17	5.11E-01
24	O3	Emergency Room Visits, Asthma	18 - 99	7.88E-01
25	PM2.5	Emergency Room Visits, Asthma	0 - 99	4.82E-01
25	PM2.5	Mortality, All Cause	30 - 99	9.72E-01
25	PM2.5	Hospital Admissions, Asthma	0 - 64	2.99E-02
25	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	7.84E-02
25	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.62E-01
25	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	4.01E-05
25	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	3.29E-03
25	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	7.92E-03
25	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	1.28E-02
25	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	4.75E-02
25	O3	Hospital Admissions, All Respiratory	65 - 99	4.78E-02
25	O3	Mortality, Non-Accidental	0 - 99	2.68E-02
25	O3	Emergency Room Visits, Asthma	0 - 17	2.54E-01
25	O3	Emergency Room Visits, Asthma	18 - 99	3.77E-01
26	PM2.5	Emergency Room Visits, Asthma	0 - 99	5.51E-01
26	PM2.5	Mortality, All Cause	30 - 99	1.60E+00

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
26	PM2.5	Hospital Admissions, Asthma	0 - 64	2.15E-02
26	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.05E-01
26	PM2.5	Hospital Admissions, All Respiratory	65 - 99	2.53E-01
26	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	4.13E-05
26	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	2.07E-03
26	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	5.50E-03
26	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	8.73E-03
26	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	5.63E-02
26	O3	Hospital Admissions, All Respiratory	65 - 99	6.61E-02
26	O3	Mortality, Non-Accidental	0 - 99	4.00E-02
26	O3	Emergency Room Visits, Asthma	0 - 17	3.26E-01
26	O3	Emergency Room Visits, Asthma	18 - 99	5.39E-01
27	PM2.5	Emergency Room Visits, Asthma	0 - 99	2.57E-01
27	PM2.5	Mortality, All Cause	30 - 99	6.27E-01
27	PM2.5	Hospital Admissions, Asthma	0 - 64	1.37E-02
27	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	3.65E-02
27	PM2.5	Hospital Admissions, All Respiratory	65 - 99	9.16E-02
27	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	2.81E-05
27	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.33E-03
27	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	3.07E-03
27	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	4.76E-03
27	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	2.10E-02
27	O3	Hospital Admissions, All Respiratory	65 - 99	5.24E-02
27	O3	Mortality, Non-Accidental	0 - 99	3.13E-02
27	O3	Emergency Room Visits, Asthma	0 - 17	2.61E-01
27	O3	Emergency Room Visits, Asthma	18 - 99	4.29E-01
28	PM2.5	Emergency Room Visits, Asthma	0 - 99	5.44E-01
28	PM2.5	Mortality, All Cause	30 - 99	9.03E-01
28	PM2.5	Hospital Admissions, Asthma	0 - 64	3.04E-02

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
28	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	7.24E-02
28	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.72E-01
28	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	4.16E-05
28	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	2.80E-03
28	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	6.45E-03
28	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	1.07E-02
28	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	4.05E-02
28	O3	Hospital Admissions, All Respiratory	65 - 99	4.34E-02
28	O3	Mortality, Non-Accidental	0 - 99	2.14E-02
28	O3	Emergency Room Visits, Asthma	0 - 17	2.64E-01
28	O3	Emergency Room Visits, Asthma	18 - 99	3.79E-01
29	PM2.5	Emergency Room Visits, Asthma	0 - 99	4.39E-01
29	PM2.5	Mortality, All Cause	30 - 99	1.03E+00
29	PM2.5	Hospital Admissions, Asthma	0 - 64	2.76E-02
29	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	7.88E-02
29	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.63E-01
29	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	4.00E-05
29	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	3.10E-03
29	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	7.52E-03
29	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	1.22E-02
29	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	4.83E-02
29	O3	Hospital Admissions, All Respiratory	65 - 99	8.76E-02
29	O3	Mortality, Non-Accidental	0 - 99	5.30E-02
29	O3	Emergency Room Visits, Asthma	0 - 17	3.72E-01
29	O3	Emergency Room Visits, Asthma	18 - 99	6.06E-01
30	PM2.5	Emergency Room Visits, Asthma	0 - 99	2.69E-01
30	PM2.5	Mortality, All Cause	30 - 99	6.13E-01
30	PM2.5	Hospital Admissions, Asthma	0 - 64	1.66E-02
30	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	4.29E-02

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
30	PM2.5	Hospital Admissions, All Respiratory	65 - 99	9.46E-02
30	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	2.74E-05
30	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.77E-03
30	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	4.08E-03
30	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	6.64E-03
30	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	2.61E-02
30	O3	Hospital Admissions, All Respiratory	65 - 99	5.13E-02
30	O3	Mortality, Non-Accidental	0 - 99	3.13E-02
30	O3	Emergency Room Visits, Asthma	0 - 17	2.62E-01
30	O3	Emergency Room Visits, Asthma	18 - 99	4.14E-01
31	PM2.5	Emergency Room Visits, Asthma	0 - 99	1.79E-01
31	PM2.5	Mortality, All Cause	30 - 99	4.31E-01
31	PM2.5	Hospital Admissions, Asthma	0 - 64	1.07E-02
31	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	2.88E-02
31	PM2.5	Hospital Admissions, All Respiratory	65 - 99	6.80E-02
31	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	1.79E-05
31	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.06E-03
31	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	2.48E-03
31	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	4.07E-03
31	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	1.69E-02
31	O3	Hospital Admissions, All Respiratory	65 - 99	3.95E-02
31	O3	Mortality, Non-Accidental	0 - 99	2.31E-02
31	O3	Emergency Room Visits, Asthma	0 - 17	1.95E-01
31	O3	Emergency Room Visits, Asthma	18 - 99	3.12E-01
32	PM2.5	Emergency Room Visits, Asthma	0 - 99	2.43E-01
32	PM2.5	Mortality, All Cause	30 - 99	5.58E-01
32	PM2.5	Hospital Admissions, Asthma	0 - 64	1.52E-02
32	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	4.11E-02
32	PM2.5	Hospital Admissions, All Respiratory	65 - 99	8.88E-02
32	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	2.33E-05

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
32	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.61E-03
32	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	3.86E-03
32	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	6.27E-03
32	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	2.50E-02
32	O3	Hospital Admissions, All Respiratory	65 - 99	5.02E-02
32	O3	Mortality, Non-Accidental	0 - 99	2.97E-02
32	O3	Emergency Room Visits, Asthma	0 - 17	2.38E-01
32	O3	Emergency Room Visits, Asthma	18 - 99	3.84E-01
33	PM2.5	Emergency Room Visits, Asthma	0 - 99	5.59E-01
33	PM2.5	Mortality, All Cause	30 - 99	1.90E+00
33	PM2.5	Hospital Admissions, Asthma	0 - 64	3.40E-02
33	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.19E-01
33	PM2.5	Hospital Admissions, All Respiratory	65 - 99	3.17E-01
33	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	7.34E-05
33	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	3.16E-03
33	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	9.15E-03
33	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	1.45E-02
33	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	7.54E-02
33	O3	Hospital Admissions, All Respiratory	65 - 99	6.42E-02
33	O3	Mortality, Non-Accidental	0 - 99	3.22E-02
33	O3	Emergency Room Visits, Asthma	0 - 17	2.22E-01
33	O3	Emergency Room Visits, Asthma	18 - 99	3.79E-01
34	PM2.5	Emergency Room Visits, Asthma	0 - 99	2.76E-01
34	PM2.5	Mortality, All Cause	30 - 99	6.93E-01
34	PM2.5	Hospital Admissions, Asthma	0 - 64	1.62E-02
34	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	6.11E-02
34	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.56E-01
34	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	2.69E-05
34	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.57E-03
34	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	5.10E-03

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
34	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	7.87E-03
34	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	3.57E-02
34	O3	Hospital Admissions, All Respiratory	65 - 99	6.01E-02
34	O3	Mortality, Non-Accidental	0 - 99	2.88E-02
34	O3	Emergency Room Visits, Asthma	0 - 17	1.86E-01
34	O3	Emergency Room Visits, Asthma	18 - 99	3.21E-01
35	PM2.5	Emergency Room Visits, Asthma	0 - 99	2.36E-01
35	PM2.5	Mortality, All Cause	30 - 99	6.00E-01
35	PM2.5	Hospital Admissions, Asthma	0 - 64	1.46E-02
35	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	4.82E-02
35	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.19E-01
35	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	2.32E-05
35	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.62E-03
35	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	4.03E-03
35	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	6.01E-03
35	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	2.82E-02
35	O3	Hospital Admissions, All Respiratory	65 - 99	6.09E-02
35	O3	Mortality, Non-Accidental	0 - 99	2.84E-02
35	O3	Emergency Room Visits, Asthma	0 - 17	2.02E-01
35	O3	Emergency Room Visits, Asthma	18 - 99	3.40E-01
36	PM2.5	Emergency Room Visits, Asthma	0 - 99	1.61E-01
36	PM2.5	Mortality, All Cause	30 - 99	4.23E-01
36	PM2.5	Hospital Admissions, Asthma	0 - 64	9.77E-03
36	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	3.77E-02
36	PM2.5	Hospital Admissions, All Respiratory	65 - 99	9.61E-02
36	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	1.44E-05
36	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.00E-03
36	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	2.93E-03
36	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	4.56E-03
36	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	2.15E-02

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
36	O3	Hospital Admissions, All Respiratory	65 - 99	4.81E-02
36	O3	Mortality, Non-Accidental	0 - 99	2.29E-02
36	O3	Emergency Room Visits, Asthma	0 - 17	1.40E-01
36	O3	Emergency Room Visits, Asthma	18 - 99	2.46E-01
37	PM2.5	Emergency Room Visits, Asthma	0 - 99	1.16E-01
37	PM2.5	Mortality, All Cause	30 - 99	3.08E-01
37	PM2.5	Hospital Admissions, Asthma	0 - 64	7.21E-03
37	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	2.74E-02
37	PM2.5	Hospital Admissions, All Respiratory	65 - 99	7.08E-02
37	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	1.00E-05
37	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	6.75E-04
37	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	2.11E-03
37	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	3.76E-03
37	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	1.55E-02
37	O3	Hospital Admissions, All Respiratory	65 - 99	3.29E-02
37	O3	Mortality, Non-Accidental	0 - 99	1.65E-02
37	O3	Emergency Room Visits, Asthma	0 - 17	1.04E-01
37	O3	Emergency Room Visits, Asthma	18 - 99	1.81E-01
38	PM2.5	Emergency Room Visits, Asthma	0 - 99	1.57E-01
38	PM2.5	Mortality, All Cause	30 - 99	4.37E-01
38	PM2.5	Hospital Admissions, Asthma	0 - 64	9.00E-03
38	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	3.52E-02
38	PM2.5	Hospital Admissions, All Respiratory	65 - 99	8.87E-02
38	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	1.44E-05
38	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	8.92E-04
38	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	2.61E-03
38	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	4.17E-03
38	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	1.99E-02
38	O3	Hospital Admissions, All Respiratory	65 - 99	4.94E-02
38	O3	Mortality, Non-Accidental	0 - 99	2.62E-02

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
38	O3	Emergency Room Visits, Asthma	0 - 17	1.38E-01
38	O3	Emergency Room Visits, Asthma	18 - 99	2.49E-01
39	PM2.5	Emergency Room Visits, Asthma	0 - 99	2.19E-01
39	PM2.5	Mortality, All Cause	30 - 99	5.68E-01
39	PM2.5	Hospital Admissions, Asthma	0 - 64	1.25E-02
39	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	4.56E-02
39	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.13E-01
39	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	2.42E-05
39	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.25E-03
39	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	3.72E-03
39	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	5.83E-03
39	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	2.64E-02
39	O3	Hospital Admissions, All Respiratory	65 - 99	5.25E-02
39	O3	Mortality, Non-Accidental	0 - 99	2.84E-02
39	O3	Emergency Room Visits, Asthma	0 - 17	1.57E-01
39	O3	Emergency Room Visits, Asthma	18 - 99	2.78E-01
40	PM2.5	Emergency Room Visits, Asthma	0 - 99	3.63E-01
40	PM2.5	Mortality, All Cause	30 - 99	9.09E-01
40	PM2.5	Hospital Admissions, Asthma	0 - 64	2.04E-02
40	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	8.14E-02
40	PM2.5	Hospital Admissions, All Respiratory	65 - 99	2.07E-01
40	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	3.34E-05
40	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.98E-03
40	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	6.84E-03
40	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	1.03E-02
40	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	4.72E-02
40	O3	Hospital Admissions, All Respiratory	65 - 99	6.78E-02
40	O3	Mortality, Non-Accidental	0 - 99	3.68E-02
40	O3	Emergency Room Visits, Asthma	0 - 17	2.09E-01

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CONT

Source	Pollutant	Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean) (Reduced Sacramento 4-km Domain)
40	O3	Emergency Room Visits, Asthma	18 - 99	3.64E-01
41	PM2.5	Emergency Room Visits, Asthma	0 - 99	2.42E-01
41	PM2.5	Mortality, All Cause	30 - 99	9.07E-01
41	PM2.5	Hospital Admissions, Asthma	0 - 64	1.37E-02
41	PM2.5	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	5.85E-02
41	PM2.5	Hospital Admissions, All Respiratory	65 - 99	1.42E-01
41	PM2.5	Acute Myocardial Infarction, Nonfatal	18 - 24	2.32E-05
41	PM2.5	Acute Myocardial Infarction, Nonfatal	25 - 44	1.48E-03
41	PM2.5	Acute Myocardial Infarction, Nonfatal	45 - 54	3.72E-03
41	PM2.5	Acute Myocardial Infarction, Nonfatal	55 - 64	6.30E-03
41	PM2.5	Acute Myocardial Infarction, Nonfatal	65 - 99	3.24E-02
41	O3	Hospital Admissions, All Respiratory	65 - 99	6.34E-02
41	O3	Mortality, Non-Accidental	0 - 99	3.89E-02
41	O3	Emergency Room Visits, Asthma	0 - 17	1.62E-01
41	O3	Emergency Room Visits, Asthma	18 - 99	3.00E-01

1. Affected age ranges are shown . Other age ranges are available, but the endpoints and age ranges shown here are the ones used by the USEPA in its health assessments. The age ranges are consistent with the epidemiological study that is the basis of the health function.
2. Health effects are shown in terms of incidences of each health endpoint and how it compares to the base (2035 base year health effect incidences, or "background health incidence") values. Health effects and background health incidences are across the Sacramento reduced 4-km model domain.

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CONT

APPENDIX G
BENMAP HEALTH EFFECTS RESULTS FOR SIX STRATEGIC AREA PROJECTS

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CONT

Appendix G: BenMAP health effects results for the six sources used in the Strategic Area Project Screening Modeling in Appendix C, in which BenMAP was run separately to get ozone and $PM_{2.5}$ health effects for the three major precursors (NOx, VOC and PM) emissions at the higher 8xTOS (high_8x) and lower 2xTOS (low_2x) emission rates.

Six Strategic Area Project Identifications and Locations				
ID	**Name**	**Latitude**	**Longitude**	**Location**
I	West Roseville	38.765833	-121.359299	Fiddyment Road & Pleasant Grove Boulevard
II	Rancho Cordova	38.588080	-121.286765	Zinfandel Drive & White Rock Road
III	Downtown Sacramento	38.579336	-121.494119	10th Street & K Street
IV	South Sacramento	38.490489	-121.468468	Florin Road & Franklin Boulevard
V	Woodland	38.677388	-121.765759	Main Street & East Street
VI	Vacaville	38.347954	-121.998058	Merchant Street & Lincoln Highway

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CONT

Strategic area Src	Emissions	Species-Precursor	Health Endpoint	Age Range[1]	Incidences per year[2] (Mean) (Reduced Sacramento 4-km Domain)
I	high_8x	O3-NOx	Hospital Admissions, All Respiratory	65 - 99	6.89E-01
I	high_8x	O3-NOx	Mortality, Non-Accidental	0 - 99	4.42E-01
I	high_8x	O3-NOx	Emergency Room Visits, Asthma	18 - 99	4.30E+00
I	high_8x	O3-NOx	Emergency Room Visits, Asthma	0 - 17	2.55E+00
II	high_8x	O3-NOx	Hospital Admissions, All Respiratory	65 - 99	5.52E-01
II	high_8x	O3-NOx	Mortality, Non-Accidental	0 - 99	3.49E-01
II	high_8x	O3-NOx	Emergency Room Visits, Asthma	18 - 99	3.64E+00
II	high_8x	O3-NOx	Emergency Room Visits, Asthma	0 - 17	2.12E+00
III	high_8x	O3-NOx	Hospital Admissions, All Respiratory	65 - 99	4.88E-01
III	high_8x	O3-NOx	Mortality, Non-Accidental	0 - 99	3.02E-01
III	high_8x	O3-NOx	Emergency Room Visits, Asthma	18 - 99	3.90E+00
III	high_8x	O3-NOx	Emergency Room Visits, Asthma	0 - 17	2.42E+00
IV	high_8x	O3-NOx	Hospital Admissions, All Respiratory	65 - 99	5.55E-01

Strategic area Src	Emissions	Species-Precursor	Health Endpoint	Age Range[1]	Incidences per year[2] (Mean) (Reduced Sacramento 4-km Domain)
IV	high_8x	O3-NOx	Mortality, Non-Accidental	0 - 99	3.45E-01
IV	high_8x	O3-NOx	Emergency Room Visits, Asthma	18 - 99	2.94E+00
IV	high_8x	O3-NOx	Emergency Room Visits, Asthma	0 - 17	4.56E+00
V	high_8x	O3-NOx	Hospital Admissions, All Respiratory	65 - 99	3.79E-01
V	high_8x	O3-NOx	Mortality, Non-Accidental	0 - 99	2.33E-01
V	high_8x	O3-NOx	Emergency Room Visits, Asthma	18 - 99	3.04E+00
V	high_8x	O3-NOx	Emergency Room Visits, Asthma	0 - 17	1.94E+00
VI	high_8x	O3-NOx	Hospital Admissions, All Respiratory	65 - 99	4.71E-01
VI	high_8x	O3-NOx	Mortality, Non-Accidental	0 - 99	2.86E-01
VI	high_8x	O3-NOx	Emergency Room Visits, Asthma	18 - 99	4.04E+00
VI	high_8x	O3-NOx	Emergency Room Visits, Asthma	0 - 17	2.45E+00
I	low_2x	O3-NOx	Hospital Admissions, All Respiratory	65 - 99	1.93E-01
I	low_2x	O3-NOx	Mortality, Non-Accidental	0 - 99	1.24E-01
I	low_2x	O3-NOx	Emergency Room Visits, Asthma	18 - 99	1.21E+00
I	low_2x	O3-NOx	Emergency Room Visits, Asthma	0 - 17	7.18E-01
II	low_2x	O3-NOx	Hospital Admissions, All Respiratory	65 - 99	1.49E-01
II	low_2x	O3-NOx	Mortality, Non-Accidental	0 - 99	9.42E-02
II	low_2x	O3-NOx	Emergency Room Visits, Asthma	18 - 99	9.89E-01
II	low_2x	O3-NOx	Emergency Room Visits, Asthma	0 - 17	5.76E-01
III	low_2x	O3-NOx	Hospital Admissions, All Respiratory	65 - 99	1.30E-01
III	low_2x	O3-NOx	Mortality, Non-Accidental	0 - 99	8.05E-02
III	low_2x	O3-NOx	Emergency Room Visits, Asthma	18 - 99	1.04E+00
III	low_2x	O3-NOx	Emergency Room Visits, Asthma	0 - 17	6.44E-01
IV	low_2x	O3-NOx	Hospital Admissions, All Respiratory	65 - 99	1.50E-01
IV	low_2x	O3-NOx	Mortality, Non-Accidental	0 - 99	9.39E-02
IV	low_2x	O3-NOx	Emergency Room Visits, Asthma	18 - 99	1.25E+00
IV	low_2x	O3-NOx	Emergency Room Visits, Asthma	0 - 17	8.12E-01
V	low_2x	O3-NOx	Hospital Admissions, All Respiratory	65 - 99	9.97E-02
V	low_2x	O3-NOx	Mortality, Non-Accidental	0 - 99	6.18E-02
V	low_2x	O3-NOx	Emergency Room Visits, Asthma	18 - 99	8.00E-01
V	low_2x	O3-NOx	Emergency Room Visits, Asthma	0 - 17	5.11E-01
VI	low_2x	O3-NOx	Hospital Admissions, All Respiratory	65 - 99	1.23E-01

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CONT

Strategic area Src	Emissions	Species-Precursor	Health Endpoint	Age Range[1]	Incidences per year[2] (Mean) (Reduced Sacramento 4-km Domain)
VI	low_2x	O3-NOx	Mortality, Non-Accidental	0 - 99	7.45E-02
VI	low_2x	O3-NOx	Emergency Room Visits, Asthma	18 - 99	1.06E+00
VI	low_2x	O3-NOx	Emergency Room Visits, Asthma	0 - 17	6.39E-01
I	high_8x	O3-VOC	Hospital Admissions, All Respiratory	65 - 99	4.25E-02
I	high_8x	O3-VOC	Mortality, Non-Accidental	0 - 99	2.61E-02
I	high_8x	O3-VOC	Emergency Room Visits, Asthma	18 - 99	3.01E-01
I	high_8x	O3-VOC	Emergency Room Visits, Asthma	0 - 17	1.84E-01
II	high_8x	O3-VOC	Hospital Admissions, All Respiratory	65 - 99	4.29E-02
II	high_8x	O3-VOC	Mortality, Non-Accidental	0 - 99	2.68E-02
II	high_8x	O3-VOC	Emergency Room Visits, Asthma	18 - 99	3.09E-01
II	high_8x	O3-VOC	Emergency Room Visits, Asthma	0 - 17	1.86E-01
III	high_8x	O3-VOC	Hospital Admissions, All Respiratory	65 - 99	7.49E-02
III	high_8x	O3-VOC	Mortality, Non-Accidental	0 - 99	4.72E-02
III	high_8x	O3-VOC	Emergency Room Visits, Asthma	18 - 99	6.57E-01
III	high_8x	O3-VOC	Emergency Room Visits, Asthma	0 - 17	4.05E-01
IV	high_8x	O3-VOC	Hospital Admissions, All Respiratory	65 - 99	7.10E-02
IV	high_8x	O3-VOC	Mortality, Non-Accidental	0 - 99	4.39E-02
IV	high_8x	O3-VOC	Emergency Room Visits, Asthma	18 - 99	4.09E-01
IV	high_8x	O3-VOC	Emergency Room Visits, Asthma	0 - 17	6.28E-01
V	high_8x	O3-VOC	Hospital Admissions, All Respiratory	65 - 99	3.66E-02
V	high_8x	O3-VOC	Mortality, Non-Accidental	0 - 99	2.28E-02
V	high_8x	O3-VOC	Emergency Room Visits, Asthma	18 - 99	3.10E-01
V	high_8x	O3-VOC	Emergency Room Visits, Asthma	0 - 17	1.97E-01
VI	high_8x	O3-VOC	Hospital Admissions, All Respiratory	65 - 99	3.60E-02
VI	high_8x	O3-VOC	Mortality, Non-Accidental	0 - 99	2.13E-02
VI	high_8x	O3-VOC	Emergency Room Visits, Asthma	18 - 99	3.14E-01
VI	high_8x	O3-VOC	Emergency Room Visits, Asthma	0 - 17	1.86E-01
I	low_2x	O3-VOC	Hospital Admissions, All Respiratory	65 - 99	1.01E-02
I	low_2x	O3-VOC	Mortality, Non-Accidental	0 - 99	6.18E-03
I	low_2x	O3-VOC	Emergency Room Visits, Asthma	18 - 99	7.17E-02
I	low_2x	O3-VOC	Emergency Room Visits, Asthma	0 - 17	4.40E-02
II	low_2x	O3-VOC	Hospital Admissions, All Respiratory	65 - 99	1.02E-02

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CONT

Strategic area Src	Emissions	Species-Precursor	Health Endpoint	Age Range[1]	Incidences per year[2] (Mean) (Reduced Sacramento 4-km Domain)
II	low_2x	O3-VOC	Mortality, Non-Accidental	0 - 99	6.35E-03
II	low_2x	O3-VOC	Emergency Room Visits, Asthma	18 - 99	7.35E-02
II	low_2x	O3-VOC	Emergency Room Visits, Asthma	0 - 17	4.43E-02
III	low_2x	O3-VOC	Hospital Admissions, All Respiratory	65 - 99	1.82E-02
III	low_2x	O3-VOC	Mortality, Non-Accidental	0 - 99	1.15E-02
III	low_2x	O3-VOC	Emergency Room Visits, Asthma	18 - 99	1.60E-01
III	low_2x	O3-VOC	Emergency Room Visits, Asthma	0 - 17	9.84E-02
IV	low_2x	O3-VOC	Hospital Admissions, All Respiratory	65 - 99	1.72E-02
IV	low_2x	O3-VOC	Mortality, Non-Accidental	0 - 99	1.06E-02
IV	low_2x	O3-VOC	Emergency Room Visits, Asthma	18 - 99	1.52E-01
IV	low_2x	O3-VOC	Emergency Room Visits, Asthma	0 - 17	9.90E-02
V	low_2x	O3-VOC	Hospital Admissions, All Respiratory	65 - 99	8.81E-03
V	low_2x	O3-VOC	Mortality, Non-Accidental	0 - 99	5.46E-03
V	low_2x	O3-VOC	Emergency Room Visits, Asthma	18 - 99	7.47E-02
V	low_2x	O3-VOC	Emergency Room Visits, Asthma	0 - 17	4.74E-02
VI	low_2x	O3-VOC	Hospital Admissions, All Respiratory	65 - 99	8.81E-03
VI	low_2x	O3-VOC	Mortality, Non-Accidental	0 - 99	5.19E-03
VI	low_2x	O3-VOC	Emergency Room Visits, Asthma	18 - 99	7.66E-02
VI	low_2x	O3-VOC	Emergency Room Visits, Asthma	0 - 17	4.53E-02
I	high_8x	PM25-NOx	Emergency Room Visits, Asthma	0 - 99	4.15E-01
I	high_8x	PM25-NOx	Mortality, All Cause	30 - 99	9.73E-01
I	high_8x	PM25-NOx	Hospital Admissions, Asthma	0 - 64	2.62E-02
I	high_8x	PM25-NOx	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	7.58E-02
I	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	18 - 24	3.65E-05
I	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	25 - 44	2.91E-03
I	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	45 - 54	7.09E-03
I	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	55 - 64	1.15E-02
I	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	65 - 99	4.63E-02
I	high_8x	PM25-NOx	Hospital Admissions, All Respiratory	65 - 99	1.53E-01
II	high_8x	PM25-NOx	Emergency Room Visits, Asthma	0 - 99	3.94E-01
II	high_8x	PM25-NOx	Mortality, All Cause	30 - 99	9.27E-01

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CONT

Strategic area Src	Emissions	Species-Precursor	Health Endpoint	Age Range[1]	Incidences per year[2] (Mean) (Reduced Sacramento 4-km Domain)
II	high_8x	PM25-NOx	Hospital Admissions, Asthma	0 - 64	2.50E-02
II	high_8x	PM25-NOx	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	7.45E-02
II	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	18 - 24	3.38E-05
II	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	25 - 44	2.77E-03
II	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	45 - 54	6.87E-03
II	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	55 - 64	1.12E-02
II	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	65 - 99	4.59E-02
II	high_8x	PM25-NOx	Hospital Admissions, All Respiratory	65 - 99	1.46E-01
III	high_8x	PM25-NOx	Emergency Room Visits, Asthma	0 - 99	4.69E-01
III	high_8x	PM25-NOx	Mortality, All Cause	30 - 99	9.99E-01
III	high_8x	PM25-NOx	Hospital Admissions, Asthma	0 - 64	2.95E-02
III	high_8x	PM25-NOx	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	7.88E-02
III	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	18 - 24	4.12E-05
III	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	25 - 44	3.24E-03
III	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	45 - 54	7.70E-03
III	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	55 - 64	1.27E-02
III	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	65 - 99	4.85E-02
III	high_8x	PM25-NOx	Hospital Admissions, All Respiratory	65 - 99	1.61E-01
IV	high_8x	PM25-NOx	Emergency Room Visits, Asthma	0 - 99	1.35E+01
IV	high_8x	PM25-NOx	Mortality, All Cause	30 - 99	2.70E+01
IV	high_8x	PM25-NOx	Hospital Admissions, Asthma	0 - 64	8.94E-01
IV	high_8x	PM25-NOx	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	2.36E+00
IV	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	18 - 24	1.22E-03
IV	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	25 - 44	9.72E-02
IV	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	45 - 54	2.43E-01
IV	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	55 - 64	4.02E-01
IV	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	65 - 99	1.52E+00
IV	high_8x	PM25-NOx	Hospital Admissions, All Respiratory	65 - 99	4.10E+00
V	high_8x	PM25-NOx	Emergency Room Visits, Asthma	0 - 99	2.70E-01
V	high_8x	PM25-NOx	Mortality, All Cause	30 - 99	5.87E-01
V	high_8x	PM25-NOx	Hospital Admissions, Asthma	0 - 64	1.62E-02

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CONT

Strategic area Src	Emissions	Species-Precursor	Health Endpoint	Age Range[1]	Incidences per year[2] (Mean) (Reduced Sacramento 4-km Domain)
V	high_8x	PM25-NOx	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	4.19E-02
V	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	18 - 24	2.69E-05
V	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	25 - 44	1.66E-03
V	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	45 - 54	3.83E-03
V	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	55 - 64	6.25E-03
V	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	65 - 99	2.49E-02
V	high_8x	PM25-NOx	Hospital Admissions, All Respiratory	65 - 99	9.56E-02
VI	high_8x	PM25-NOx	Emergency Room Visits, Asthma	0 - 99	2.22E-01
VI	high_8x	PM25-NOx	Mortality, All Cause	30 - 99	4.75E-01
VI	high_8x	PM25-NOx	Hospital Admissions, Asthma	0 - 64	1.22E-02
VI	high_8x	PM25-NOx	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	3.52E-02
VI	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	18 - 24	1.93E-05
VI	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	25 - 44	1.19E-03
VI	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	45 - 54	2.97E-03
VI	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	55 - 64	4.76E-03
VI	high_8x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	65 - 99	2.01E-02
VI	high_8x	PM25-NOx	Hospital Admissions, All Respiratory	65 - 99	7.88E-02
I	low_2x	PM25-NOx	Emergency Room Visits, Asthma	0 - 99	1.02E-01
I	low_2x	PM25-NOx	Mortality, All Cause	30 - 99	2.39E-01
I	low_2x	PM25-NOx	Hospital Admissions, Asthma	0 - 64	6.41E-03
I	low_2x	PM25-NOx	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.86E-02
I	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	18 - 24	8.93E-06
I	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	25 - 44	7.14E-04
I	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	45 - 54	1.74E-03
I	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	55 - 64	2.82E-03
I	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	65 - 99	1.14E-02
I	low_2x	PM25-NOx	Hospital Admissions, All Respiratory	65 - 99	3.75E-02
II	low_2x	PM25-NOx	Emergency Room Visits, Asthma	0 - 99	9.82E-02
II	low_2x	PM25-NOx	Mortality, All Cause	30 - 99	2.31E-01
II	low_2x	PM25-NOx	Hospital Admissions, Asthma	0 - 64	6.22E-03
II	low_2x	PM25-NOx	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.86E-02

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Strategic area Src	Emissions	Species-Precursor	Health Endpoint	Age Range[1]	Incidences per year[2] (Mean) (Reduced Sacramento 4-km Domain)
II	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	18 - 24	8.41E-06
II	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	25 - 44	6.90E-04
II	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	45 - 54	1.71E-03
II	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	55 - 64	2.80E-03
II	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	65 - 99	1.15E-02
II	low_2x	PM25-NOx	Hospital Admissions, All Respiratory	65 - 99	3.64E-02
III	low_2x	PM25-NOx	Emergency Room Visits, Asthma	0 - 99	1.18E-01
III	low_2x	PM25-NOx	Mortality, All Cause	30 - 99	2.51E-01
III	low_2x	PM25-NOx	Hospital Admissions, Asthma	0 - 64	7.40E-03
III	low_2x	PM25-NOx	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.98E-02
III	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	18 - 24	1.03E-05
III	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	25 - 44	8.14E-04
III	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	45 - 54	1.93E-03
III	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	55 - 64	3.20E-03
III	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	65 - 99	1.22E-02
III	low_2x	PM25-NOx	Hospital Admissions, All Respiratory	65 - 99	4.02E-02
IV	low_2x	PM25-NOx	Emergency Room Visits, Asthma	0 - 99	1.34E-01
IV	low_2x	PM25-NOx	Mortality, All Cause	30 - 99	2.76E-01
IV	low_2x	PM25-NOx	Hospital Admissions, Asthma	0 - 64	8.52E-03
IV	low_2x	PM25-NOx	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	2.25E-02
IV	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	18 - 24	1.17E-05
IV	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	25 - 44	9.29E-04
IV	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	45 - 54	2.26E-03
IV	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	55 - 64	3.71E-03
IV	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	65 - 99	1.39E-02
IV	low_2x	PM25-NOx	Hospital Admissions, All Respiratory	65 - 99	4.44E-02
V	low_2x	PM25-NOx	Emergency Room Visits, Asthma	0 - 99	6.70E-02
V	low_2x	PM25-NOx	Mortality, All Cause	30 - 99	1.46E-01
V	low_2x	PM25-NOx	Hospital Admissions, Asthma	0 - 64	4.03E-03
V	low_2x	PM25-NOx	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.04E-02
V	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	18 - 24	6.71E-06

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CONT

Strategic area Src	Emissions	Species-Precursor	Health Endpoint	Age Range[1]	Incidences per year[2] (Mean) (Reduced Sacramento 4-km Domain)
V	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	25 - 44	4.12E-04
V	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	45 - 54	9.52E-04
V	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	55 - 64	1.55E-03
V	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	65 - 99	6.18E-03
V	low_2x	PM25-NOx	Hospital Admissions, All Respiratory	65 - 99	2.38E-02
VI	low_2x	PM25-NOx	Emergency Room Visits, Asthma	0 - 99	5.58E-02
VI	low_2x	PM25-NOx	Mortality, All Cause	30 - 99	1.19E-01
VI	low_2x	PM25-NOx	Hospital Admissions, Asthma	0 - 64	3.04E-03
VI	low_2x	PM25-NOx	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	8.80E-03
VI	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	18 - 24	4.83E-06
VI	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	25 - 44	2.98E-04
VI	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	45 - 54	7.43E-04
VI	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	55 - 64	1.19E-03
VI	low_2x	PM25-NOx	Acute Myocardial Infarction, Nonfatal	65 - 99	5.01E-03
VI	low_2x	PM25-NOx	Hospital Admissions, All Respiratory	65 - 99	1.97E-02
I	high_8x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	5.87E+00
I	high_8x	PM25-PM	Mortality, All Cause	30 - 99	1.66E+01
I	high_8x	PM25-PM	Hospital Admissions, Asthma	0 - 64	3.60E-01
I	high_8x	PM25-PM	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.16E+00
I	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	18 - 24	5.29E-04
I	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	25 - 44	4.18E-02
I	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	45 - 54	9.84E-02
I	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	55 - 64	1.55E-01
I	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	65 - 99	6.85E-01
I	high_8x	PM25-PM	Hospital Admissions, All Respiratory	65 - 99	2.46E+00
II	high_8x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	7.02E+00
II	high_8x	PM25-PM	Mortality, All Cause	30 - 99	1.79E+01
II	high_8x	PM25-PM	Hospital Admissions, Asthma	0 - 64	4.49E-01
II	high_8x	PM25-PM	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.52E+00
II	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	18 - 24	5.76E-04
II	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	25 - 44	5.08E-02

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CONT

Strategic area Src	Emissions	Species-Precursor	Health Endpoint	Age Range[1]	Incidences per year[2] (Mean) (Reduced Sacramento 4-km Domain)
II	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	45 - 54	1.31E-01
II	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	55 - 64	2.12E-01
II	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	65 - 99	9.61E-01
II	high_8x	PM25-PM	Hospital Admissions, All Respiratory	65 - 99	2.74E+00
III	high_8x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	8.31E+00
III	high_8x	PM25-PM	Mortality, All Cause	30 - 99	2.10E+01
III	high_8x	PM25-PM	Hospital Admissions, Asthma	0 - 64	5.33E-01
III	high_8x	PM25-PM	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.48E+00
III	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	18 - 24	7.59E-04
III	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	25 - 44	6.41E-02
III	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	45 - 54	1.44E-01
III	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	55 - 64	2.44E-01
III	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	65 - 99	9.53E-01
III	high_8x	PM25-PM	Hospital Admissions, All Respiratory	65 - 99	2.93E+00
IV	high_8x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	1.35E+01
IV	high_8x	PM25-PM	Mortality, All Cause	30 - 99	2.70E+01
IV	high_8x	PM25-PM	Hospital Admissions, Asthma	0 - 64	2.36E+00
IV	high_8x	PM25-PM	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	1.52E+00
IV	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	18 - 24	1.22E-03
IV	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	25 - 44	9.72E-02
IV	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	45 - 54	2.43E-01
IV	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	55 - 64	4.02E-01
IV	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	65 - 99	1.52E+00
IV	high_8x	PM25-PM	Hospital Admissions, All Respiratory	65 - 99	4.10E+00
V	high_8x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	3.27E+00
V	high_8x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	3.27E+00
V	high_8x	PM25-PM	Mortality, All Cause	30 - 99	9.58E+00
V	high_8x	PM25-PM	Hospital Admissions, Asthma	0 - 64	1.94E-01
V	high_8x	PM25-PM	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	3.97E-01
V	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	18 - 24	4.70E-04
V	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	25 - 44	2.10E-02

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Strategic area Src	Emissions	Species-Precursor	Health Endpoint	Age Range[1]	Incidences per year[2] (Mean) (Reduced Sacramento 4-km Domain)
V	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	45 - 54	3.77E-02
V	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	55 - 64	5.59E-02
V	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	65 - 99	2.50E-01
V	high_8x	PM25-PM	Hospital Admissions, All Respiratory	65 - 99	1.18E+00
VI	high_8x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	6.86E+00
VI	high_8x	PM25-PM	Mortality, All Cause	30 - 99	1.29E+01
VI	high_8x	PM25-PM	Hospital Admissions, Asthma	0 - 64	2.43E-01
VI	high_8x	PM25-PM	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	8.10E-01
VI	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	18 - 24	5.37E-04
VI	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	25 - 44	2.53E-02
VI	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	45 - 54	6.61E-02
VI	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	55 - 64	9.00E-02
VI	high_8x	PM25-PM	Acute Myocardial Infarction, Nonfatal	65 - 99	4.37E-01
VI	high_8x	PM25-PM	Hospital Admissions, All Respiratory	65 - 99	1.95E+00
I	low_2x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	1.45E+00
I	low_2x	PM25-PM	Mortality, All Cause	30 - 99	4.13E+00
I	low_2x	PM25-PM	Hospital Admissions, Asthma	0 - 64	8.88E-02
I	low_2x	PM25-PM	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	2.87E-01
I	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	18 - 24	1.31E-04
I	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	25 - 44	1.03E-02
I	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	45 - 54	2.43E-02
I	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	55 - 64	3.83E-02
I	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	65 - 99	1.70E-01
I	low_2x	PM25-PM	Hospital Admissions, All Respiratory	65 - 99	6.11E-01
II	low_2x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	1.76E+00
II	low_2x	PM25-PM	Mortality, All Cause	30 - 99	4.48E+00
II	low_2x	PM25-PM	Hospital Admissions, Asthma	0 - 64	1.12E-01
II	low_2x	PM25-PM	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	3.79E-01
II	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	18 - 24	1.44E-04
II	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	25 - 44	1.27E-02
II	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	45 - 54	3.28E-02

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Strategic area Src	Emissions	Species-Precursor	Health Endpoint	Age Range[1]	Incidences per year[2] (Mean) (Reduced Sacramento 4-km Domain)
II	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	55 - 64	5.30E-02
II	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	65 - 99	2.40E-01
II	low_2x	PM25-PM	Hospital Admissions, All Respiratory	65 - 99	6.84E-01
III	low_2x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	2.08E+00
III	low_2x	PM25-PM	Mortality, All Cause	30 - 99	5.25E+00
III	low_2x	PM25-PM	Hospital Admissions, Asthma	0 - 64	1.33E-01
III	low_2x	PM25-PM	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	3.71E-01
III	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	18 - 24	1.90E-04
III	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	25 - 44	1.60E-02
III	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	45 - 54	3.59E-02
III	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	55 - 64	6.11E-02
III	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	65 - 99	2.39E-01
III	low_2x	PM25-PM	Hospital Admissions, All Respiratory	65 - 99	7.31E-01
IV	low_2x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	3.36E+00
IV	low_2x	PM25-PM	Mortality, All Cause	30 - 99	6.73E+00
IV	low_2x	PM25-PM	Hospital Admissions, Asthma	0 - 64	2.23E-01
IV	low_2x	PM25-PM	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	5.86E-01
IV	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	18 - 24	3.04E-04
IV	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	25 - 44	2.42E-02
IV	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	45 - 54	6.04E-02
IV	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	55 - 64	1.00E-01
IV	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	65 - 99	3.78E-01
IV	low_2x	PM25-PM	Hospital Admissions, All Respiratory	65 - 99	1.02E+00
V	low_2x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	8.16E-01
V	low_2x	PM25-PM	Mortality, All Cause	30 - 99	2.39E+00
V	low_2x	PM25-PM	Hospital Admissions, Asthma	0 - 64	4.86E-02
V	low_2x	PM25-PM	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	9.92E-02
V	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	18 - 24	1.18E-04
V	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	25 - 44	5.25E-03
V	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	45 - 54	9.43E-03
V	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	55 - 64	1.40E-02

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Strategic area Src	Emissions	Species-Precursor	Health Endpoint	Age Range[1]	Incidences per year[2] (Mean) (Reduced Sacramento 4-km Domain)
V	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	65 - 99	6.24E-02
V	low_2x	PM25-PM	Hospital Admissions, All Respiratory	65 - 99	2.94E-01
VI	low_2x	PM25-PM	Emergency Room Visits, Asthma	0 - 99	1.70E+00
VI	low_2x	PM25-PM	Mortality, All Cause	30 - 99	3.20E+00
VI	low_2x	PM25-PM	Hospital Admissions, Asthma	0 - 64	6.05E-02
VI	low_2x	PM25-PM	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	2.01E-01
VI	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	18 - 24	1.33E-04
VI	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	25 - 44	6.30E-03
VI	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	45 - 54	1.65E-02
VI	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	55 - 64	2.25E-02
VI	low_2x	PM25-PM	Acute Myocardial Infarction, Nonfatal	65 - 99	1.09E-01
VI	low_2x	PM25-PM	Hospital Admissions, All Respiratory	65 - 99	4.83E-01

1. Affected age ranges are shown. Other age ranges are available, but the endpoints and age ranges shown here are the ones used by the USEPA in its health assessments. The age ranges are consistent with the epidemiological study that is the basis of the health function.
2. Health effects are shown in terms of incidences of each health endpoint and how these compare to the base (2035 base year health effect incidences, or "background health incidence") values. Health effects and background health incidences are across the Sacramento reduced 4-km model domain.

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San Joaquin Valley AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

Emission Reduction Clean Air Measures

This document contains a list of clean air measures to assist land use agencies and developers to identify ways to reduce air quality impacts associated with development projects occurring in the San Joaquin Valley. The clean air measures listed below can be incorporated into the design of development projects to reduce air quality emissions impacts under District rules and regulations (e.g. District Rule 9510 - ISR) or state or federal law (e.g. California Environmental Quality Act, National Environmental Policy Act). Please note that this is not an exhaustive list, and both land use agencies and developers are encouraged to suggest new clean air measures including supporting documentation that are not listed below for inclusion into the design of development projects.

Clean Air Measure	Description
Clean Construction Equipment	Utilize the cleanest available off-road construction equipment, including the latest Tier diesel or electric equipment (e.g. scrapers, graders, trenchers, tractors, loaders, backhoes, etc.).
Zero-Emission On-Road Vehicles	Utilize electric on-road vehicles, such as: • Electric heavy-duty trucks • Electric medium-duty last-mile delivery vehicles • Electric buses • Electric municipal waste transport trucks • Electric light-duty delivery vans • Electric light-duty pick-up trucks and personal vehicles
Near-Zero On-Road Vehicles	Utilize alternative fueled clean vehicles such as compressed/liquid natural gas with exhaust control systems, including heavy-duty trucks that meet the California Air Resources Board's (CARB) established emission standard of 0.02 g/bhp-hr NOx.
On-Site Zero-Emission Off-Road Vehicles and Equipment	Utilize electric off-road vehicles and equipment (e.g., forklifts, yard trucks, and aerial lifts).
Electric Vehicle Charging Infrastructure	Install and utilize electric vehicle (EV) charger(s) at the project site to promote the use of low or zero-emission vehicles.
Alternative Fuels Infrastructure	Installation of fueling infrastructure for compressed or liquid natural gas, or hydrogen fuel cell stations to promote the use of near-zero emission vehicles.

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Clean Air Measure	Description
Clean Lawn and Garden Equipment	Installation of fueling infrastructure for compressed or liquid natural gas, or hydrogen fuel cell stations to promote the use of near-zero emission vehicles.
Solar Panels	Install and utilize solar panels as a renewable energy source.
Clean Residential Heating Devices	Install clean residential heating devices such as certified wood burning residential fireplaces and wood stoves, natural gas fireplace inserts, or electric heat pumps.
Warehouse/Distribution Center Clean Air Design Measures	The following project designs for warehouse development projects can be incorporated as additional emission reduction strategies: • Ensure HHD vehicles minimize idling time (e.g., 3 minute maximum) • Ensure solid screen buffering trees, solid decorative walls, and/or other natural ground landscaping techniques are implemented along the property line of adjacent sensitive receptors • Ensure all landscaping be drought tolerant • Orient loading docks away from sensitive receptors, unless physically impossible • Locate loading docks a minimum of 300 feet away from the property line of sensitive receptor unless dock is exclusively used for electric trucks • Incorporate signage and pavement markings to clearly identify on-site circulation patterns to minimize unnecessary on-site vehicle travel • Locate truck entries on streets of a higher commercial classification • Ensure all building roofs are solar-ready • Ensure all portions of roof tops that are not covered with solar panels are constructed to have light colored roofing material with a solar reflective index of greater than 78 • Ensure rooftop solar panels are installed and operated to supply 100% of the power needed to operate all non-refrigerated portions of the development project • Ensure power sources at loading docks for all refrigerated trucks have “plugin” capacity, which will eliminate prolonged idling while loading and unloading goods • Incorporate bicycle racks and electric bike plug-ins • Require the use of low volatile organic compounds (VOC) architectural and industrial maintenance coatings
Electrical Outlets	This measure utilizes electrical outlets on the exterior of project buildings as necessary for sufficient powering of electric landscaping equipment.

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Clean Air Measure	Description
Increase Density of Land-Uses	This measure encourages the siting of development projects with increased densities in order to reduce vehicle miles traveled (VMT) emissions and improve walkability and transit ridership in the area. Density is usually measured in terms of persons, jobs, or dwellings per unit area. Increased densities affect the distance people travel and provide greater options for the mode of travel they choose.
Increase Diversity of Surrounding Land-Use Types	This measure encourages the siting of development projects near various land-use types such as retail, mixed-use, etc. in order to reduce vehicle miles traveled (VMT) emissions and improve walkability and transit ridership in the area.
Improve Walkability Design	This measure implements design elements into a development project that enhance walkability and connectivity. Improved street network characteristics within a neighborhood could include street accessibility, usually measured in terms of average block size, proportion of four-way intersections, or number of intersections per square mile. Examples of design implementation are sidewalk coverage, building setbacks, street widths, pedestrian crossings, presence of street trees, and a host of other physical variables that differentiate pedestrian-oriented environments from auto-oriented environments.
Improve Destination Accessibility	This measure locates development projects in an area with high accessibility to destinations. Destination accessibility is measured in terms of the number of jobs or other attractions reachable within a given travel time, which tends to be highest at central locations and lowest at peripheral locations, where the number of people and attractions are less dense. The location of the project could also increase the potential for pedestrians to walk and bike to these destinations, therefore reducing the VMT in the project area.
Increase Transit Accessibility	This measure locates development projects with high density near transit, which could promote the use of transit by people traveling to or from the project site. The use of transit could result in a mode shift and therefore could reduce VMT. The project should, at a minimum, include the following design features: • A transit station/stop with high-quality, high-frequency bus service located within a 5-10 minute walk (or roughly ¼ mile from stop to edge of development), and/or • A rail station located within a 20 minute walk (or roughly ½ mile from station to edge of development) • Fast, frequent, and reliable transit service connecting to a high percentage of regional destinations • Neighborhood designed for walking and cycling

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CONT

Clean Air Measure	Description
Affordable and Below Market Rate Housing	Income has a statistically significant effect on the probability that a commuter will take transit or walk to work. Below Market Rate Housing provides greater opportunity for lower income families to live closer to jobs centers and achieve jobs/housing match near transit. It also addresses to some degree the risk that new transit oriented development would displace lower income families. This measure encourages development projects to incorporate a greater percentage of smaller units into the design to allow a greater number of families to be accommodated on infill and transit-oriented development sites within a given building footprint and height limit.
Improve Pedestrian Network	This measure provides a pedestrian access network to link areas of the project site to encourage people to walk instead of drive. This mode shift could result in people driving less and thus could result in a reduction in VMT. The project could provide a pedestrian access network that internally links all uses and connects to all existing or planned external streets and pedestrian facilities contiguous with the project site. The project could minimize barriers to pedestrian access and interconnectivity. Physical barriers such as walls, landscaping, and slopes that impede pedestrian circulation could be eliminated.
Provide Traffic Calming Measures	This measure is to provide traffic calming measures, which could encourage people to walk or bike instead of using a vehicle. This mode shift could result in a decrease in VMT. Project design could include pedestrian/bicycle safety and traffic calming measures in excess of jurisdiction requirements. Roadways could be designed to reduce motor vehicle speeds and encourage pedestrian and bicycle trips with traffic calming features. Traffic calming features may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others.
Neighborhood Electric Vehicle (NEV) Network	This measure creates local "light" vehicle networks, such as NEV networks. NEVs are classified in the California Vehicle Code as a “low speed vehicle”. They are electric powered and must conform to applicable federal automobile safety standards. NEVs offer an alternative to traditional vehicle trips and can legally be used on roadways with speed limits of 35 MPH or less (unless specifically restricted). They are ideal for short trips up to 30 miles in length. To create an NEV network, the project will implement the necessary infrastructure, including NEV parking, charging facilities, striping, signage, and educational tools. NEV routes can be implemented throughout the project and can double as bicycle routes.

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CONT

Clean Air Measure	Description
Limit Parking Supply	This measure implements a change in parking requirements and the types of supply within a project site to encourage alternative transportation choices by project residents and employees. This could be accomplished using the following strategies: • Elimination (or reduction) of minimum parking requirements • Creation of maximum parking allowed • Provision of shared parking
Unbundle Parking Costs	This measure unbundles parking costs from property costs. Unbundling separates parking from property costs, requiring those who wish to purchase parking spaces to do so at an additional cost from the property cost. This could remove the burden from those who do not wish to utilize a parking space. Parking could be priced separately from home rents/purchase prices or office leases.
Implement Market Price On-Street Public Parking	This measure implements a pricing strategy for parking by pricing all central business district/employment center/retail center on-street parking. As a result, it deters parking spillover from project supplied parking to other public parking nearby.
Transit Subsidy	This measure promotes the use of subsidized/discounted daily or monthly public transit passes. The project may also provide free transfers between all shuttles and transit to participants. These passes can be partially or wholly subsidized by the employer, school, or development. Many entities use revenue from parking to offset the cost of such project.
Employee Parking "Cash-Out"	This measure implements an employee parking "cash-out." The term "cash-out" is used to describe the employer providing employees with a choice of forgoing their current subsidized/free parking for a cash payment equivalent to the cost of the parking space to the employer.
Workplace Parking Charges	This measure implements workplace parking charges at its employment centers. This may include: explicitly charging for parking for its employees, implementing above market rate pricing, validating parking only for invited guests, not provided employee parking and transportation allowances, and educating employees about available alternatives. This strategy focuses on implementing market rate and above market rate pricing to provide a price signal for employees to consider alternative modes for their work commute.
School Bus Program	This measure works with school districts to restore or expand school bus services in the project area and local community.

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CONT

Clean Air Measure	Description
Telecommuting and Alternative Work Schedule	This measure encourages telecommuting and alternative work schedules, which could reduce the number of commute trips. Alternative work schedules could take in the form of staggered starting times, flexible schedules, or compressed work weeks (e.g., 4/40, 9/80).
Market Commute Trip Reduction Option	This measure implements marketing strategies that contribute to reductions in commute trips. Information sharing and marketing are important components to successful commute trip reduction strategies. Marketing strategies may include: • New employee orientation of trip reduction and alternative mode options • Event promotions • Publications
Employee Vanpool/Shuttle	This measure implements employer-sponsored vanpools and/or shuttles to reduce employees VMT to and from work. A vanpool will usually service employees' commute to work while a shuttle will service nearby transit stations and surrounding commercial centers. Employer-sponsored vanpool programs entail an employer purchasing or leasing vans for employee use, and often subsidizing the cost of at least program administration, if not more. The driver usually receives personal use of the van, often for a mileage fee. Scheduling is within the employer's purview, and rider charges are normally set on the basis of vehicle and operating cost.
Provide Ride Sharing Program	This measure implements a ride-sharing program as well as a permanent transportation management association membership and funding requirement. Increasing the vehicle occupancy by ride sharing could result in fewer cars driving the same trip. The project could promote ride-sharing programs through a multi-faceted approach such as: • Designating a certain percentage of parking spaces for ride sharing vehicles • Designating adequate passenger loading and unloading and waiting areas for ride-sharing vehicles • Providing a web site or message board for coordinating rides
Exceed Title 24 Building Code Standards	This measure recommends that the design of new buildings meet the building energy efficiency standards of Title 24, also known as the California Building Standards Code. Title 24 Part 6 regulates energy uses including space heating and cooling, hot water heating, and ventilation. By committing to a percent improvement over Title 24, a development could reduce its energy use.

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CONT

Clean Air Measure	Description
Voluntary Emissions Reduction Agreement	A Voluntary Emissions Reduction Agreement (VERA) is a clean air measure by which the project proponent provides pound-for-pound mitigation of emissions increases through a process that develops, funds, and implements emission reduction projects. To implement a VERA, the project proponent and the District enter into a contractual agreement in which the project proponent agrees to mitigate project specific emissions by providing funds for the District's incentives programs. Types of emission reduction projects that have been funded in the past include electrification of stationary internal combustion engines (such as agricultural irrigation pumps), replacing old Heavy Heavy-Duty (HHD) trucks with new, cleaner, more efficient HHD trucks, and replacement of old farm tractors.
Bus Rapid Transit System	This measure incorporates a Bus Rapid Transit (BRT) System to provide high quality and cost effective transit services in the project area.
Park, Ride Lots, and/or Satellite Telecommuting Centers	This measure utilizes park, ride, and/or satellite telecommuting centers to reduce the degree of congestion on routes and the total VMT in the area.
Bicycle Enhancing Infrastructure	This measure utilizes various bicycle enhancing infrastructures to reduce VMT in the project area. Some of the infrastructure design elements used include: bikeways paths connecting to a bikeway system, secure bicycle parking, provides Class I and Class II bicycle parking/storage facilities on-site and/or employee lockers and showers. Bicycle parking facilities should be near destination points and easy to find. At least one bicycle parking space for every 20 vehicle parking spaces. It also provides Class I bicycle parking at apartment complexes or condos without garages and Class I or II bike lanes on arterial/collector streets, or where a suitable route exists.
On-Site Shops and Services for Employees	This measure utilizes on-site shop and services for employees such as cafeteria, bank/ATM, dry cleaners, convenience markets, etc. to reduce the number of commute trips to and from the workplace.
On-Site Child Care and Off-site Child Care within Walking Distance	This measure implements on-site childcare or provides off-site childcare within walking distance of the project to reduce the number of commute trips to and from the workplace.
Mid-Day Shuttle Services for Employees	This measure establishes mid-day shuttle services for employees, who commute from the work-site to food service establishments and other commercial areas during peak commute periods (e.g. schedule service during lunch hours) in order to reduce the number of commute trips.
Shuttle Services to Transit Stations/Multimodal Centers	This measure establishes shuttle services to transit stations and multimodal centers for employees to reduce the number of commute trips to and from the workplace.

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Clean Air Measure	Description
Preferential Parking for Carpool and Vanpool Vehicles	This measure implements preferential parking areas for carpool and vanpool vehicles. It is most effective if parking supply is limited and/or located far from the building entrance.
Parking Fees for Single Occupancy Vehicle Commuters	This measure implements preferential parking areas for carpool and vanpool vehicles. It is most effective if parking supply is limited and/or located far from the building entrance.
Speed Limit Signs and Erosion Control	This measure ensures speed limit signs are posted on unpaved roads limiting traffic to no more than 15 mph and ensures sandbags or other erosion control measures are installed to public roadways from sites with a slope greater than one percent. This measure should be implemented to reduce construction related PM_{10} impacts.
Clean-Air Vehicle Parking	Labeling or signage limiting parking stalls for clean-air or electric vehicles only.
Pedestrian Access and Connectivity	This measure utilize the following design elements to increase pedestrian access and connectivity: • Provide continuous sidewalks separated from the roadway by landscaping and on-street parking. • Provide on and off-site pedestrian facility improvements such as trails linking them to designated pedestrian commuting routes and/or on-site overpasses and wider sidewalks. • Link cul-de-sacs and dead-end streets to encourage pedestrian and bicycle travel. • Provide traffic reduction modifications to project roads, such as: narrower streets, speed platforms, bulb-outs and intersection modifications designed to reduce vehicle speeds and to encourage pedestrian and bicycle travel. • Provide a parking lot design that includes clearly marked and shaded pedestrian pathways between transit facilities and building entrances. • Provide pedestrian access between bus service and major transportation points and to destination points within the project.
Windblown Dust Reduction Strategies	These measures utilize the following design elements to minimize emissions from windblown dust during construction-related activities: • On-site water sprays or other dust suppression materials • Construct and maintain wind barriers sufficient to limit visible dust to 20% opacity on the construction site. • Suspend excavation and grading activity when winds exceed 20 mph on the construction site.

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Clean Air Measure	Description
Vehicle Idling Policy	This measure implements a Vehicle Idling Policy that requires all vehicles under company control to adhere to a 5-minute idling policy and/or to minimize the idling time (e.g., 5-minute maximum) for construction-related vehicles.
Curtail Construction Periods and Implement Activity Management	This measure can help reduce the short-term construction-related impacts from a development project, by implementing the following design elements: • Curtail construction during periods of high ambient pollutant concentrations; this may include ceasing of construction activity during the peak-hour of vehicular traffic on adjacent roadways. • Implement activity management (e.g. rescheduling activities to reduce short-term impacts) during construction.
Transportation Mode Display	This measure provides a display case or kiosk displaying transportation information (e.g., Bike Route Maps, Bus Schedules, carpooling, car sharing) in a prominent area accessible to employees, residents, or visitors.
Gas Outlets	This measure ensures gas outlets are installed so outdoor cooking appliances, and any proposed fireplaces, including outdoor recreational fireplaces or pits, can be used.
HEPA Filters/Ventilation Systems	The following measures can be implemented into the project's design to reduce impacts from air-borne emissions: • Install HEPA (High Efficiency Particulate Air) filters. • Install "whole-house" or "fresh-air" ventilation systems.
Retrofit Existing Equipment	This measure retrofits existing equipment to reduce emissions using methods such as particulate filters, oxidation catalysts, or other approved technologies.

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Jennifer Clark (Jennifer.Clark@fresno.gov)
Director, City of Fresno Planning and Development Department
2600 Fresno Street
Fresno, CA 93721
21 August 2023
Re: Southeast Development Area Plan Impact Analysis

Dear Ms. Clark,

I am writing as a planning consultant who specializes in transportation impact evaluation concerning the Southeast Development Area Plan transportation impact analysis as described in the 14 July 2023 SEDA's *Draft Program Environmental Impact Report* and related documents.

This plan's predictions of vehicle miles traveled (VMT) are significantly flawed because it assumes an unrealistic internal trip capture rate that would reduce per capita VMT from 46 to 5 daily VMT, which is much lower than typical new developments.

The analysis assumes that the SEDA would be developed based on Smart Growth principles to create complete, multimodal neighborhoods where residents walk, bike and use public transit for most trips. These assumptions are unrealistic and not supported by the current proposal. For example, although the plan includes some mitigation strategies (p. 3.17-31-32), these are modest and unlikely to reduce vehicle travel 90% – significant VMT reductions require financial incentives such as cost-recovery pricing applied to all parking, plus grade-separated transit services – and complete communities typically take decades to fully develop and achieve their potential vehicle travel reductions.

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New analysis tools and guidance documents are available that could provide more accurate predictions and guidance for achieving VMT reduction targets:

Caltrans (2020), *Vehicle Miles Traveled-Focused Transportation Impact Study Guide*, California Department of Transportation (https://dot.ca.gov); at https://bit.ly/3DDSm5H. Also see *SB 743 Implementation Resources* (https://dot.ca.gov/programs/sustainability/sb-743/sb743-resources).

CAPCOA (2021), *Handbook for Analyzing Greenhouse Gas Emission Reductions*, California Air Pollution Control Association (www.caleemod.com); at www.caleemod.com/handbook/index.html.

F&P (2022), *Providing VMT: Getting Beyond LOS*, Fehr & Peers (www.fehrandpeers.com); at www.fehrandpeers.com/vmt-impacts.

ITE SB 743 Task Force (2021), *ITE Guide to SB 743: Transition from Level of Service to Vehicle Miles Traveled*, Northern California ITE (www.norcalite.org); at https://bit.ly/3CU1DIe.

Todd Litman (2018), *Land Use Impacts on Transportation*, Victoria Transport Policy Institute (www.vtpi.org); at www.vtpi.org/landtravel.pdf.

Deborah Salon (2014), *Quantifying the Effect of Local Government Actions on VMT*, Institute of Transportation Studies (https://its.ucdavis.edu); at ww3.arb.ca.gov/research/apr/past/09-343.pdf.

Robert J. Schneider, Susan L. Handy and Kevan Shafizadeh (2014), "Trip Generation for Smart Growth Projects," *ACCESS 45*, pp. 10-15; at http://tinyurl.com/oye8aqj. Also see the *Smart Growth Trip-Generation Adjustment Tool* (https://tinyurl.com/mtuhz4j8).

Most experts recommend that North American communities start growing upward instead of outward. Fresno is currently not very dense and most existing housing stock is moderate-density single-family. To implement Smart Growth and maximize sustainability and transportation efficiency, Fresno should support infill development within the existing urban boundaries rather than expand to new areas.

In my opinion, the Plan's current analysis significantly underestimates vehicle traffic congestion, crash, emission and resulting air quality impacts. Until more accurate travel modeling can be completed, and air quality impacts adjusted, this PEIR fails to predict the project's significant social and environmental impacts, and so fails to provide the information that policy makers, practitioners and the general public need to make informed decisions.

Thank you for your consideration.

Best wishes,

Todd Litman

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CEQA GUIDELINES FOR VEHICLE MILES TRAVELED THRESHOLDS

for the

CITY OF FRESNO

Adopted June 25, 2020

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CEQA GUIDELINES FOR

VEHICLE MILES TRAVELED THRESHOLDS

Submitted to:

City of Fresno
2600 Fresno Street
Fresno, California 93721

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CONT

Prepared by:

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Adopted June 25, 2020

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EXECUTIVE SUMMARY

Senate Bill (SB) 743, signed in 2013, changes the way transportation studies are conducted in California Environmental Quality Act (CEQA) documents. Vehicle miles traveled (VMT) replaces motorist delay and level of service (LOS) as the metric for impact determination. As a result of the final rulemaking surrounding SB 743 and the implementation deadline of July 1, 2020, the City of Fresno is adopting the new VMT thresholds and guidelines to address the shift from delay-based LOS CEQA traffic analyses to VMT CEQA traffic analyses.

This document discusses in further detail the following:

- Definition of region for VMT analysis
- Standardized screening methods for VMT threshold compliance data
- Recommendations for appropriate VMT significance thresholds for development projects, transportation projects, and plans
- Feasible mitigation strategies applicable for development projects, transportation projects, and plans
- For purposes of this analysis, the Fresno Council of Governments (COG) Activity-Based Model (ABM)[1] was used to develop screening maps. The Fresno COG ABM base year was updated from 2014 to 2019 based on consultation with Fresno COG staff. The appropriate use of the ABM for VMT calculations has been further elaborated in subsequent chapters of this document.

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This document will serve as a detailed guideline for preparing VMT analysis consistent with SB 743 requirements for development projects, transportation projects, and plans. Project applicants will be required to follow the guidance provided in this document for preparation of CEQA VMT analysis.

[1] Fresno COG ABM Update Report: https://www.fresnocog.org/wp-content/uploads/2017/06/Fresno-COG-ABM-Report.pdf

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LIST OF ABBREVIATIONS AND ACRONYMS

ABM	Activity-Based Model
ADT	average daily trips
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
City	City of Fresno
CO_2e	carbon dioxide equivalent
COG	Council of Governments
EIR	Environmental Impact Report
EO	Executive Order
FAR	floor-to-area ratio
GHG	greenhouse gas
GPA	General Plan Amendment
GWP	global warming potential
HOT	high-occupancy toll
HOV	high-occupancy vehicle
ITE	Institute of Transportation Engineers
LOS	level of service
mi	mile
MT	metric ton

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MPO	Metropolitan Planning Organizations
OPR	Governor's Office of Planning and Research
PRC	Public Resources Code
RTP	Regional Transportation Plan
RTPA	Regional Transportation Planning Agency
SB	Senate Bill
SCS	Sustainable Communities Strategy
sf	Square foot/feet
SOC	Statement of Overriding Considerations
TA	Technical Advisory
TDM	transportation demand management
VMT	vehicle miles traveled
ZC	Zone Change

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1.0 INTRODUCTION

Senate Bill (SB) 743, signed in 2013, changes the way transportation studies are conducted in California Environmental Quality Act (CEQA) documents. Vehicle miles traveled (VMT) replaces motorist delay and level of service (LOS) as the metric for impact determination. For development projects, VMT is simply the product of the daily trips generated by a new development and the distance those trips travel to their destinations. For capital projects, impacts are identified as the new VMT attributable to the added capital project, both from the installation of the facility and the induced growth—a new term in the CEQA lexicon—generated as a result of induced land use.

In January 2019, the Natural Resources Agency and the Governor's Office of Planning and Research (OPR) codified SB 743 into the Public Resources Code (PRC) and the *State CEQA Guidelines*. *State CEQA Guidelines* Section 15064.3 subdivision (b) states:

1. **Land Use Projects.** Vehicle miles traveled exceeding an applicable threshold of significance may indicate a significant impact. Generally, projects within one-half mile of either an existing major transit stop or a stop along an existing high quality transit corridor should be presumed to cause a less than significant transportation impact. Projects that decrease vehicle miles traveled in the project area compared to existing conditions should be presumed to have a less than significant transportation impact.

2. **Transportation Projects.** Transportation projects that reduce, or have no impact on, vehicle miles traveled should be presumed to cause a less than significant transportation impact. For roadway capacity projects, agencies have discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements. To the extent that such impacts have already been adequately addressed at a programmatic level, such as in a regional transportation plan EIR, a lead agency may tier from that analysis as provided in Section 15152.

3. **Qualitative Analysis.** If existing models or methods are not available to estimate the vehicle miles traveled for the particular project being considered, a lead agency may analyze the project's vehicle miles traveled qualitatively. Such a qualitative analysis would evaluate factors such as the availability of transit, proximity to other destinations, etc. For many projects, a qualitative analysis of construction traffic may be appropriate.

4. **Methodology.** A lead agency has discretion to choose the most appropriate methodology to evaluate a project's vehicle miles traveled, including whether to express the change in absolute terms, per capita, per household or in any other measure. A lead agency may use models to estimate a project's vehicle miles traveled, and may revise those estimates to reflect professional judgment based on substantial evidence. Any assumptions used to estimate vehicle miles traveled and any revisions to model outputs should be documented and explained in the environmental document prepared for the project. The standard of adequacy in Section 15151 shall apply to the analysis described in this section.

The OPR provides a Technical Advisory (TA) as a guidance document to establish thresholds for this new VMT metric. The laws and rules governing the CEQA process are contained in the CEQA statute

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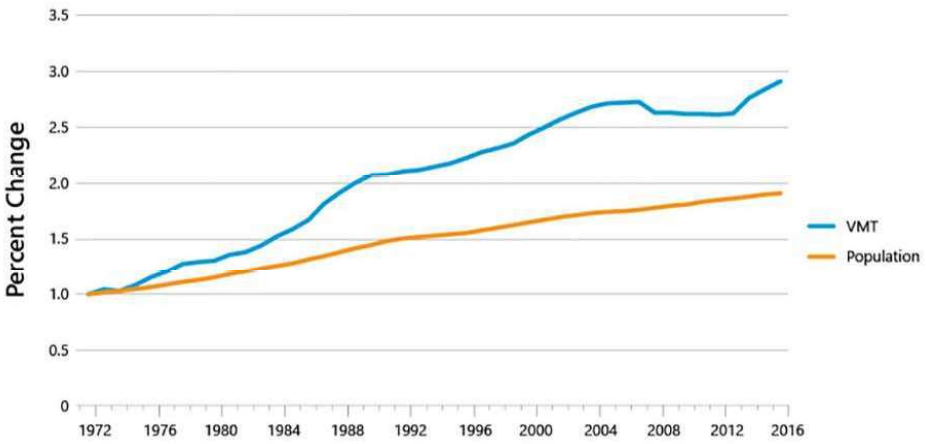
(PRC Section 21000 and following), the *State CEQA Guidelines* (California Code of Regulations, Title 14, Section 15000 and following), published court decisions interpreting CEQA, and locally adopted CEQA procedures. The TA is intended as a reference document; it does not have the weight of law. Yet, deviating from the TA is best undertaken with substantial evidence to support the agency action.

The State of California is committed to reducing greenhouse gas (GHG) emissions and achieving long-term climate change goals. To achieve these climate change goals, California needs to reduce VMT. As illustrated in Figure 1, over the last 40 years, with increase in statewide population, the overall VMT has also increased. As illustrated in Figure 2, transportation is the single largest sector contributing to the State's GHG emissions. More than 40 percent of the GHG emissions come from the transportation sector, primarily passenger cars and light-duty trucks. Reducing the number of vehicle trips and reducing the length of trips are expected to result in reduced VMT and reduced GHG emissions. The new *State CEQA Guidelines* and the establishment of VMT thresholds for CEQA analyses is linked to GHG reduction strategies and overall statewide climate change goals.



Source: https://ca50million.ca.gov/transportation/

Figure 1: VMT Per Capita Compared to Population in California

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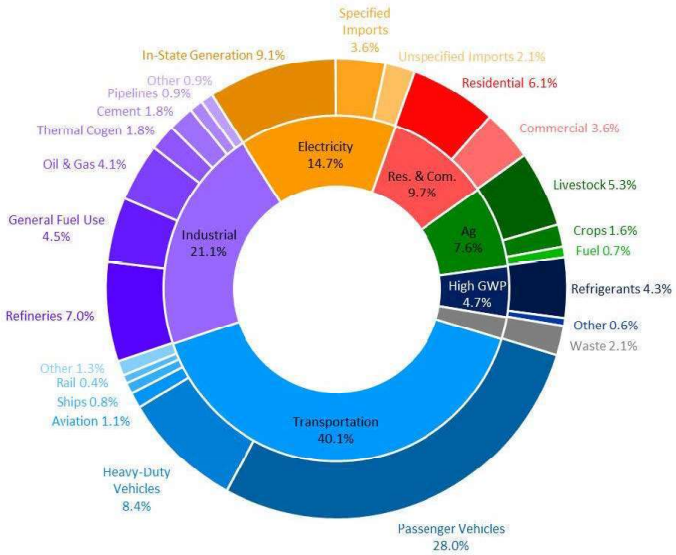

Source: California Greenhouse Gas Emissions for 2000 to 2017 Trends of Emissions and Other Indicators (California Air Resources Board Report)

Figure 2: 2017 GHG Emissions in California by Scoping Plan Sector and Sub-Sector Category

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CONT

This document establishes the City of Fresno's (City) threshold of significance for CEQA transportation studies and provides substantial evidence as appropriate. It is divided into chapters, including:

- **Chapter 2 – Definition of Region:** Here the document describes what the comparative is for analysis purposes. Each project will be compared to an existing regional average. The geographical area that defines the region is defined and described.

- **Chapter 3 – Project Screening:** OPR acknowledges that certain projects are either low VMT generators, or by virtue of their location would have a less than significant impact. The City should use these screening criteria and should offer substantial evidence for other circumstances that would lead to a less than significant impact.

- **Chapter 4 – Significance Thresholds for Development Projects:** In this chapter, the threshold that would define a significant CEQA impact is identified. This threshold is linked to a specific travel mode and a set of trip purposes. The actual VMT metric (either an efficiency rate or total VMT) is described.

- **Chapter 5 – Significant Thresholds for Transportation Projects:** This chapter describes the method to evaluate significant CEQA impacts associated with transportation projects. Many non-vehicular capital projects are presumed to have a less than significant impact. Capacity enhancing projects may have significant impacts and may be subject to a detailed analysis that will include measuring induced travel.

- **Chapter 6 – Significance Thresholds for Land Use Plans:** This chapter provides guidance and substantial evidence to support the City's treatment of land use plans and their CEQA transportation analysis.

- **Chapter 7 – Mitigation Strategies:** Potential mitigation strategies are indicated in this chapter. It is noted that this discussion is not intended as a full list of measures the City sanctions as feasible. As in previous CEQA practice, it is generally the practitioner who identifies mitigation measures to offset the specific project related impacts identified in individual environmental document. The discussion here is intended as a reference and guide for possible strategy for applicants who may wish to investigate to offset their specific project-related significant impacts.

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2.0 DEFINITION OF REGION: VEHICLE MILES TRAVELED CONTEXT

The question of context is the definition of the scope of the VMT analysis. The common term for this in previous delay-based LOS analyses is ***project study area***. In the delay-based LOS analyses, a project study area is generally determined based on the incremental increase in traffic from the project and its potential to create a significant LOS impact. This generally includes intersections and roadway segments where the project would add a prescribed number of peak-hour trips. Many times, lead agencies stop study area boundaries at their jurisdictional borders.

Unlike delay-based LOS analyses, VMT is a regional effect not defined by roadway, intersection, or pathway. The OPR acknowledges this in its TA (page 6), which states,

> *Lead agencies should not truncate any VMT analysis because of jurisdictional or other boundaries….*

Furthermore, the recommendations for thresholds for the primary land use types (residential and office) are based on a comparison to a ***regional average.*** Region is not defined further in the TA. Instead, the OPR offers the following suggestions:

1. *In cases where the region is substantially larger than the geography over which most workers would be expected to live, it might be appropriate to refer to a smaller geography, such as **county**, that includes the area over which nearly all workers would be expected to live (page 16).*

2. *For residential projects in unincorporated county areas, the local agency can compare a residential project's VMT to (1) the region's VMT per capita, or (2) the aggregate population weighted VMT per capita of all cities in the region (page 15).*

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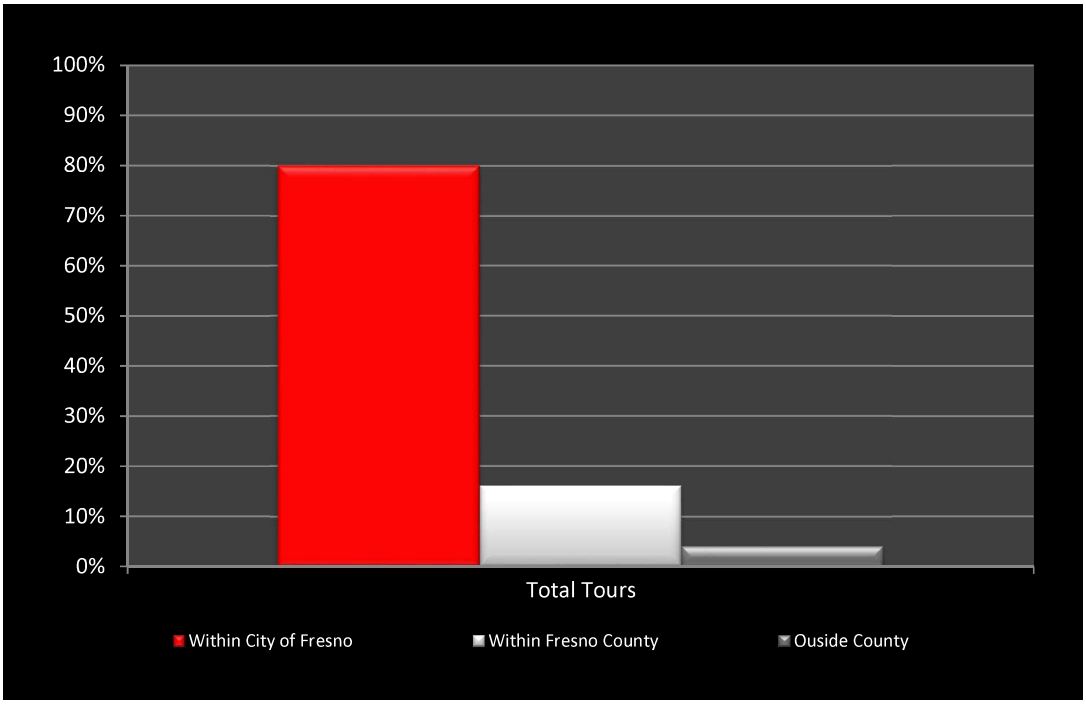
LSA surveyed other large urbanized areas around the State to identify what region has been established for VMT thresholds. In most cases, the county boundary has been identified as the region selected for VMT analysis. Mobility can be studied using a trip-based approach or a tour-based approach. The OPR TA states that "where available, tour-based assessment is ideal because it captures travel behavior more comprehensively." Since Fresno COG's model is an ABM, a tour-based approach has been followed. LSA used the Fresno COG ABM to examine the tours into and out of Fresno. As such, consistent with the OPR TA, only tours having origins or destinations or both within the City were considered. External pass-through trips were not considered. As illustrated in Figure 3, out of the total tours, about 80 percent originate and are destined within the city. Another 16 percent of tours originate or are destined within other jurisdictions in Fresno County. The remaining 4 percent home-based tours originate and are destined outside Fresno County.

Because the majority of the tours are contained within Fresno County, the county may be used to define the region. For residential projects, the TA states that "Existing VMT per capita may be measured as regional VMT per capita or as city VMT per capita. Proposed development referencing a threshold based on city VMT per capita (rather than regional VMT per capita) should not

cumulatively exceed the number of units specified in the [Sustainable Communities Strategy] SCS for that city, and should be consistent with the SCS." As such, this analysis evaluated residential VMT per capita for the City using the county as the region as well as the city boundary as the region. As illustrated in Figure 3, 85 percent of the residential trips having origins/destinations within Fresno terminate within Fresno County. Hence, based on this analysis, the City has determined to use the county as the region for all residential projects. Additionally, as illustrated in Figure 3, 90 percent of the employee trips having origins/destinations within Fresno terminate within Fresno County. Therefore, for office, retail, and all other non-residential projects, consistent with the TA, the county will be used as the region. The other OPR guidance recommends consistency in approach; once a region is established, that region should be used for all subsequent traffic analyses.

In some cases, this county boundary has other names, such as the Council of Governments boundary. Nonetheless, county is a common and reoccurring context for CEQA VMT analyses throughout the State.



Source: Fresno COG Activity Based Model

Figure 3: Percentage of Total Tours Having Origins/Destinations within the City of Fresno and Terminating within the City of Fresno, within Fresno County, or outside the County

It should be recognized the use of the county as the region defines the comparative, or the denominator, in the identification of project-related impact. The numerator is the project's VMT contribution. This project-related VMT profile may go beyond the county boundary and not be truncated by a jurisdictional boundary. For example, a new, large employment generating

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development proposed near the city's northern boundary may include VMT from as far away as Madera, Tulare, or Kings Counties or other communities in the San Joaquin Valley. In that case, it would be the responsibility of the applicant and their traffic study preparer to include the project VMT regardless of geographical limit to the satisfaction of City staff. This project-related VMT profile would be compared against the County of Fresno regional average.

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3.0 PROJECT SCREENING

The TA does acknowledge that certain activities and projects may result in a reduction in VMT and GHG emissions and therefore a less-than-significant impact to transportation and circulation. A variety of projects may be screened out of a complicated VMT analysis due to the presumption described in the TA regarding the occurrence of less-than-significant impacts.

3.1 DEVELOPMENT PROJECTS

The TA acknowledges that conditions may exist that would presume that a development project has a less than significant impact. These may be size, location, proximity to transit, or trip-making potential. For example, development projects that have one or more of the following attributes may be presumed to create a less than significant impact:

- The project is within 0.5 mile (mi) of a Transit Priority Area or a High-Quality Transit Area unless the project is inconsistent with the Regional Transportation Plan (RTP)/SCS, has a floor area ratio (FAR) less than 0.75, provides an excessive amount of parking, or reduces the number of affordable residential units. In accordance with SB 743, "Transit priority areas" are defined as "an area within one-half mile of a major transit stop that is existing or planned, if the planned stop is scheduled to be completed within the planning horizon included in a Transportation Improvement Program. A Major Transit Stop means: "a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service of 15 minutes or less during the morning and afternoon peak commute periods." A High-Quality Transit Area or Corridor is a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours.

  Figure 4 depicts transit priority areas within Fresno including high-quality transit areas (within 0.5 mile of a major transit stop) served by the Fresno Area Express (FAX) with service intervals of 15 minutes or less. Projects proposed in these areas may be presumed to have a less-than-significant transportation impact unless the project is inconsistent with the RTP/SCS, has an FAR less than 0.75, provides an excessive amount of parking, or reduces the number of affordable residential units.

- The project involves local-serving retail space of less than 50,000 square feet (sf).
- The project has a high level of affordable housing units. The afforable-housing requirement to meet the screening criteria is to be determined by City staff.
- The project generates a low volume of daily traffic.

  The TA recommends a volume of 110 average daily trips (ADT). This recommendation is not based on any analysis of GHG reduction but, rather, on a CEQA categorical exemption. This exemption criterion states that for existing facilities, including additions to existing structures of up to 10,000 sf, the project is exempted from CEQA as long as the project is in an area where public infrastructure is available to allow for maximum planned development and the project is not located in an environmentally sensible area (*State CEQA Guidelines* Section 15301,

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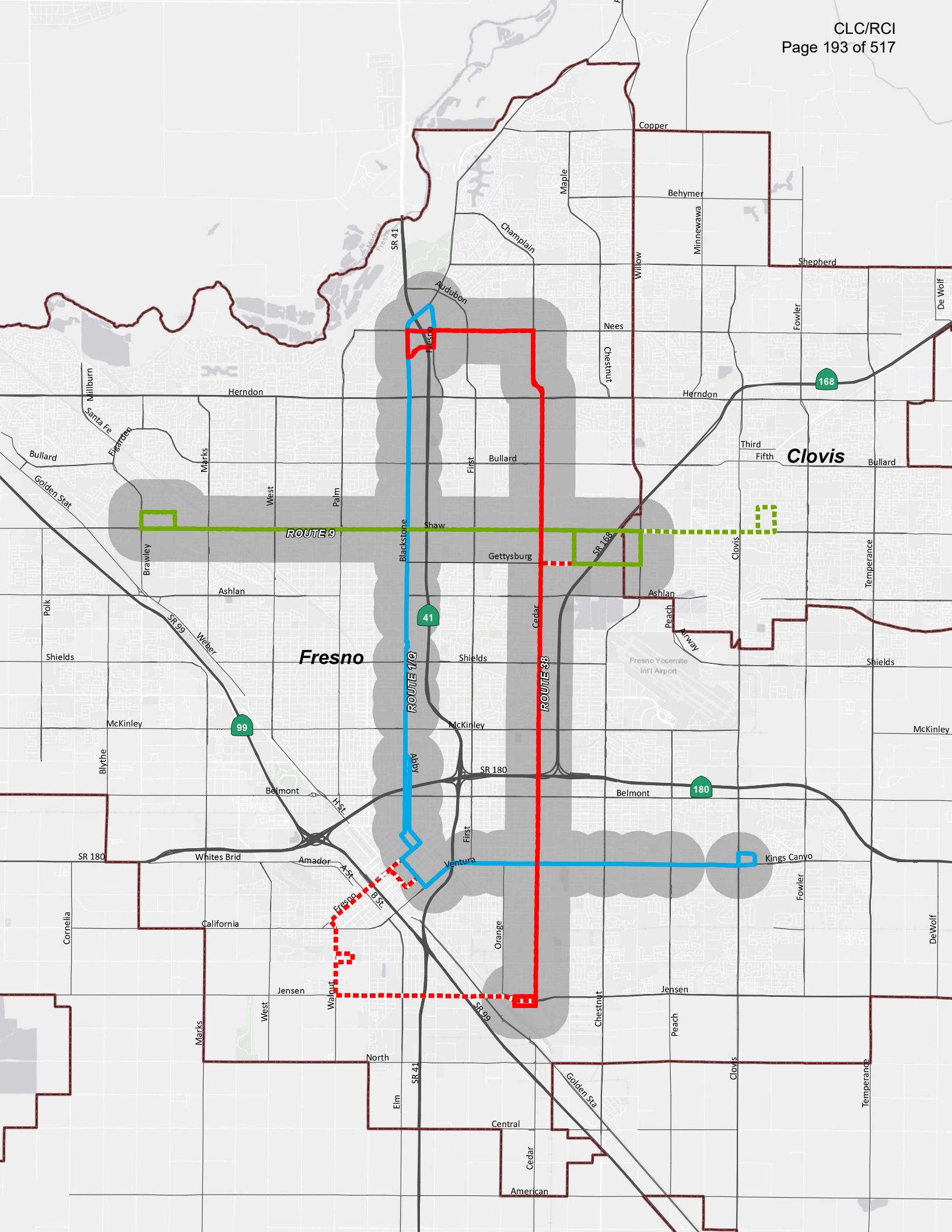
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subdivision (e)(2). As stated in the OPR TA, for projects that have a linear increase in trip generation with respect to the building footprint, the daily trip generation is anticipated to be between 110 and 124 trips per 10,000 sf. Therefore, based on this assumption, the OPR recommends 110 ADT as the screening threshold. However, the California Emissions Estimator Model (CalEEMod) was used to characterize the effect of changes in project-related ADT to the resulting GHG emissions. This model was selected because it is provided by the CARB to be used statewide for developing project-level GHG emissions. CalEEMod was used with the built-in default trip lengths and types to show the vehicular GHG emissions from incremental amounts of ADT. Table A shows the resulting annual VMT and GHG emissions from the incremental ADT.

Table A: Representative VMT and GHG Emissions from CalEEMod

Average Daily Trips (ADT)	Annual Vehicle Miles Traveled (VMT)	GHG Emissions (Metric Tons CO_2e per year)
200	683,430	258
300	1,021,812	386
400	1,386,416	514
500	1.703,020	643
600	2,043,623	771

Source: CalEEMod version 2016.3.2.
CalEEMod = California Emissions Estimator Model GHG = Greenhouse Gas
CO_2e = carbon dioxide equivalent

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A common GHG emissions threshold is 3,000 metric tons (MT) of carbon dioxide equivalent[2] (CO_2e) per year.[3] The vehicle emissions are typically more than 50 percent of the total project GHG emissions. Thus, a project with 500 ADT would generally have total project emissions that could be less than 1,300 MT CO_2e/year (i.e., 50 percent or 643 MT CO_2e/year coming from vehicle emissions and the other 50 percent coming from other project activities). As this level of GHG emissions would be less than 3,000 MT CO_2e/year, the emissions of GHG from a project up to 500 ADT would typically be less than significant. Therefore, the City will allow screening out projects if the project would generate less than 500 ADT.

- The development of institutional/government and public service uses that support community health, safety and welfare may also be screened from subsequent CEQA VMT analysis. These facilities (e.g. police stations, fire stations, community centers, refuse stations) are already part of the community and, as a public service, the VMT is accounted for in the existing regional average. Many of these facilities generate fewer than 500 ADT and/or use vehicles other than passenger-cars or light duty trucks. These other vehicle fleets are subject to regulation outside

[2] Carbon dioxide equivalent (CO_2e) is a concept developed to provide one metric that includes the effects of numerous GHGs. The global warming potential (GWP) of each GHG characterizes the ability of each GHG to trap heat in the atmosphere relative to another GHG. The GWPs of all GHGs are combined to derive the CO_2e.

[3] Source: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/ghg-significance-thresholds

of CEQA, such as the California Air Resources Board (CARB) and the San Joaquin Valley Air Pollution Control District.

- The TA states "Residential and office projects that are located in areas with low VMT, and that incorporate similar features (i.e., density, mix of uses, transit accessibility), will tend to exhibit similarly low VMT. Maps created with VMT data, for example from a travel survey or a travel demand model, can illustrate areas that are currently below threshold VMT. Because new development in such locations would likely result in a similar level of VMT, such maps may be used to screen out residential and office projects from needing to prepare a detailed VMT analysis." LSA calculated VMT per capita and VMT per employee for the City of Fresno as well as the entire Fresno County. Figure 5 illustrates the comparison of these VMTs. LSA also created screening maps that residential and office projects within the city can use to screen projects. As described earlier, the City will use Fresno County as the region. Therefore, the screening maps have been created using the county as the region. Figure 6 illustrates Fresno's VMT per capita screening map. Figure 7 illustrates the City's VMT per employee screening map. As illustrated in Figures 6 and 7, most of the low VMT zones are in the central part of Fresno, where the City's vision is to promote infill development. Therefore, the VMT thresholds and IDs of these zones will effectively screen out or exempt from further VMT analysis the desired development types the City wishes to see as part of the General Plan process.

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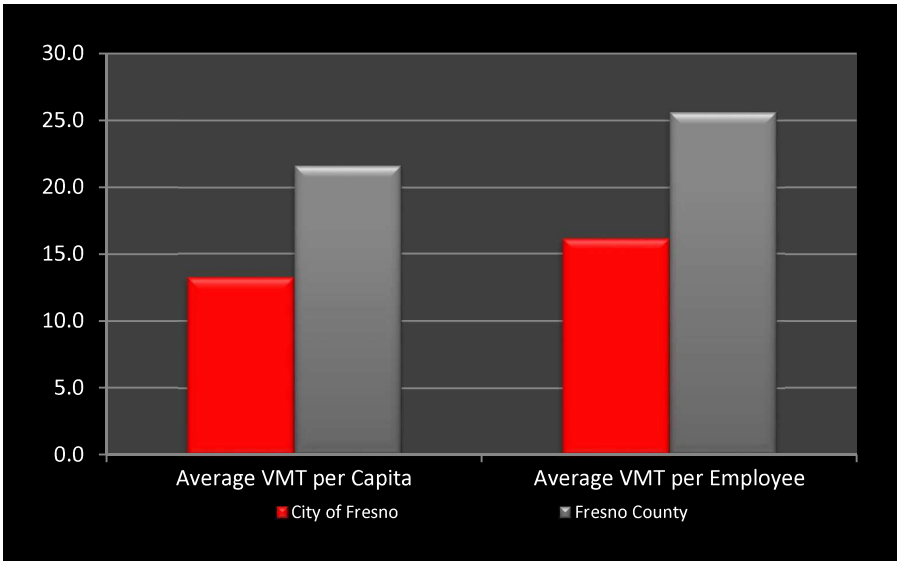
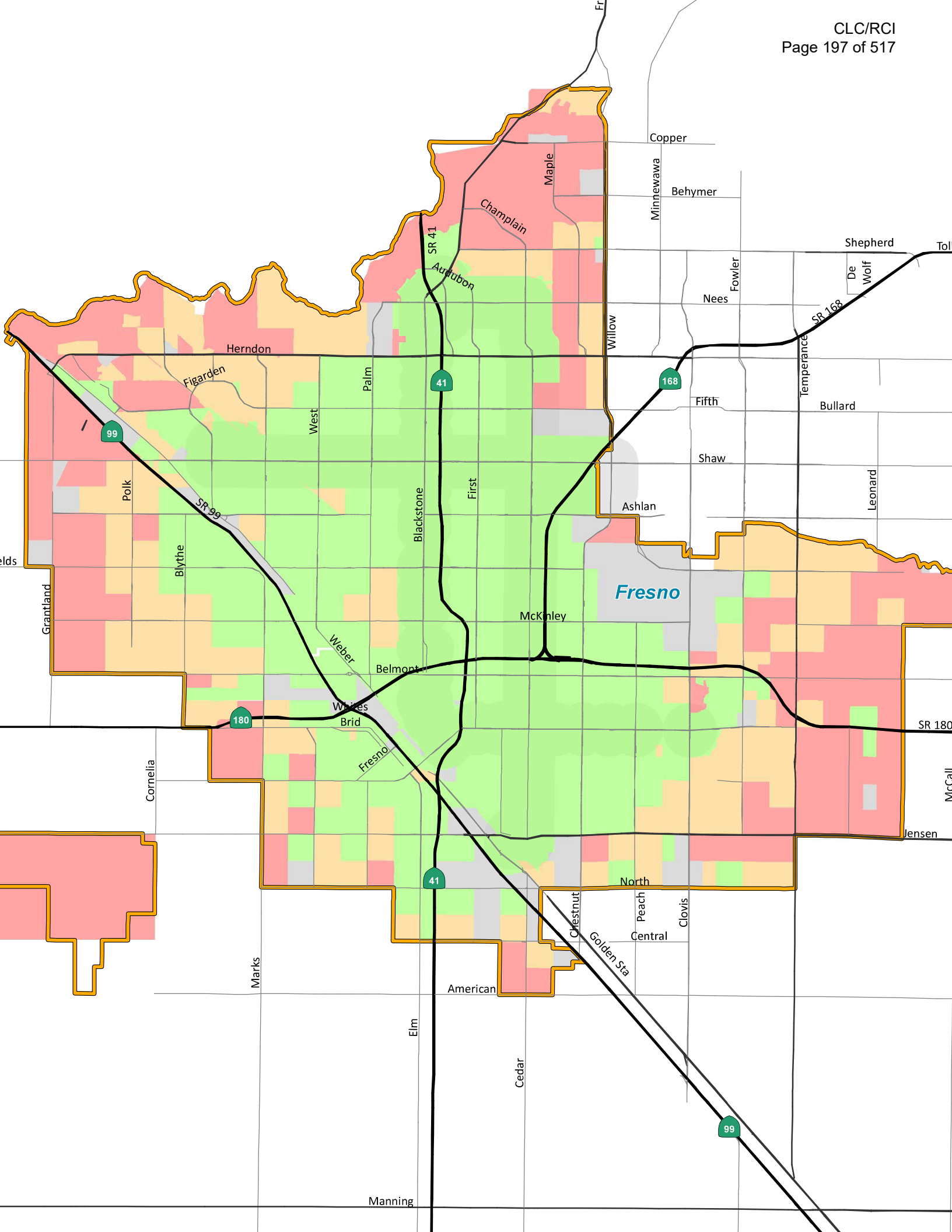


Source: Fresno COG Activity Based Model

Figure 5: Average VMT per Capita (Population) and VMT per Employee for City of Fresno and Fresno County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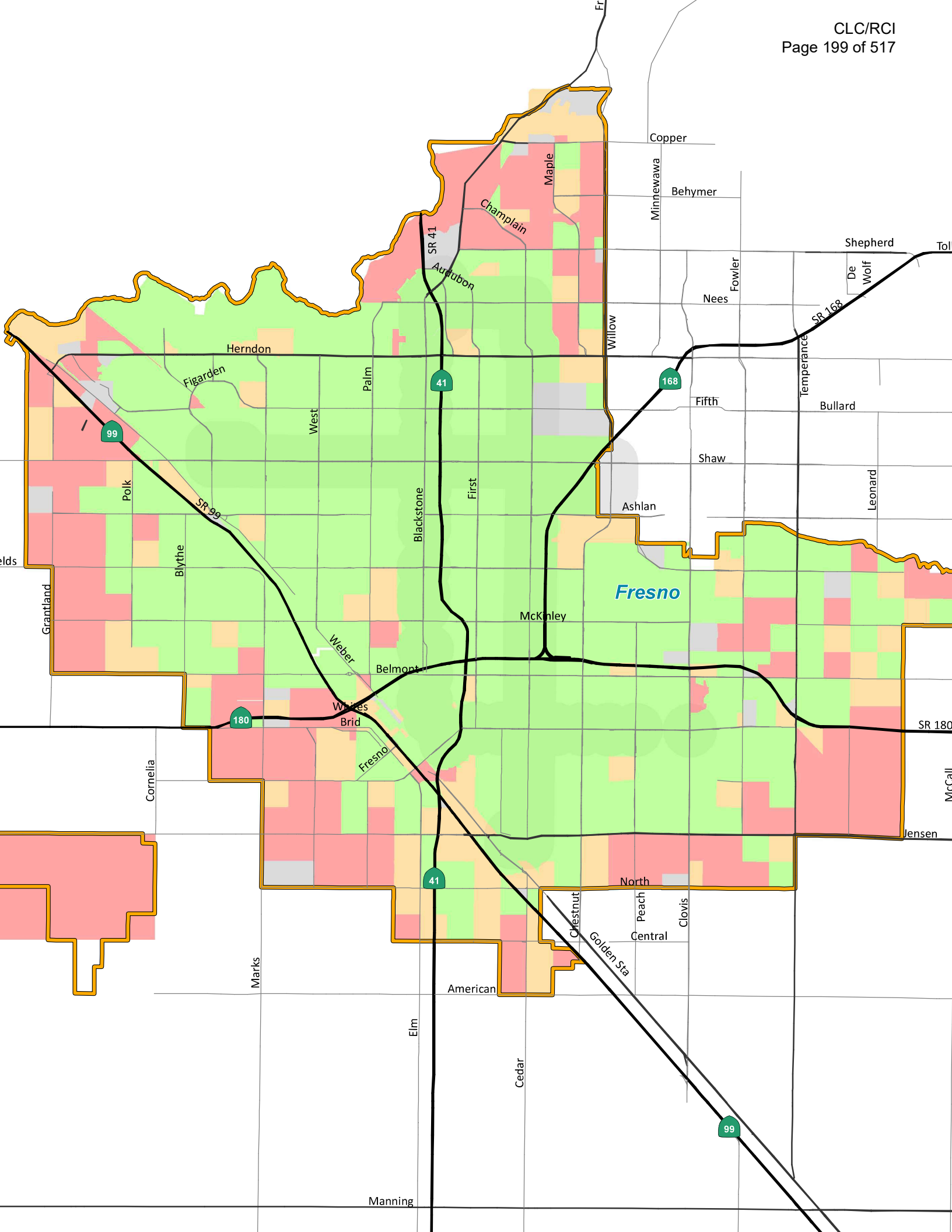
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- Based on the City's traffic study guidelines or existing CEQA guidelines, other conditions may apply to screen out projects. Consistency with other plans to reduce GHG emissions may also reflect substantial evidence supporting a screening out. Or, the City may adopt the TA recommendations in total.

The Fresno COG VMT Screening Tool[4] can be used to determine whether a development project may be screened from a detailed VMT analysis. It should be noted that if a project constitutes a General Plan Amendment (GPA) or a Zone Change (ZC), none of the above screening criteria may apply. The City will be required to evaluate such projects on a case-by-case basis to determine whether a VMT analysis would be required.

3.2 TRANSPORTATION PROJECTS

The primary attribute to consider with transportation projects is the potential to increase vehicle travel, sometimes referred to as "induced travel." Based on the OPR TA, while the City has discretion to continue to use a delay-based LOS analysis for CEQA disclosure of transportation projects, changes in vehicle travel must also be quantified. The City of Fresno will solely use VMT analysis for CEQA disclosure of transportation projects, but will also require a LOS analysis for design, traffic operations, and safety purposes. The TA lists a series of projects that would not likely lead to a substantial or measurable increase in vehicle travel and which would, therefore, not require an induced travel analysis. These include the following:

- Rehabilitation, maintenance, replacement, safety, and repair projects designed to improve the condition of existing transportation assets (e.g., highways; roadways; bridges; culverts; Transportation Management System field elements such as cameras, message signs, detection, or signals; tunnels; transit systems; and assets that serve bicycle and pedestrian facilities) and that do not add additional motor vehicle capacity
- Roadside safety devices or hardware installation such median barriers and guardrails
- Roadway shoulder enhancements to provide "breakdown space," dedicated space for use only by transit vehicles, to provide bicycle access, or to otherwise improve safety, but which will not be used as automobile vehicle travel lanes
- Addition of an auxiliary lane of less than 1 mi in length designed to improve roadway safety
- Installation, removal, or reconfiguration of traffic lanes that are not for through traffic, such as left-, right-, and U-turn pockets, two-way left-turn lanes, or emergency breakdown lanes that are not utilized as through lanes
- Addition of roadway capacity on local or collector streets, provided the project also substantially improves conditions for pedestrians, cyclists, and, if applicable, transit
- Conversion of existing general-purpose lanes (including ramps) to managed lanes or transit lanes, or changing lane management in a manner that would not substantially increase vehicle travel

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[4] Fresno COG VMT Screening Tool Link: https://www.fresnocog.org/project/sb743-regional-guidelines-development/

- Addition of a new lane that is permanently restricted to use only by transit vehicles
- Reduction in the number of through lanes
- Grade separation to separate vehicles from rail, transit, pedestrians, or bicycles, or to replace a lane in order to separate preferential vehicles (e.g., high-occupancy vehicles [HOVs], high-occupancy toll [HOT] lane traffic, or trucks) from general vehicles
- Installation, removal, or reconfiguration of traffic control devices, including Transit Signal Priority features
- Installation of traffic metering systems, detection systems, cameras, changeable message signs, and other electronics designed to optimize vehicle, bicycle, or pedestrian flow
- Timing of signals to optimize vehicle, bicycle, or pedestrian flow
- Installation of roundabouts or traffic circles
- Installation or reconfiguration of traffic calming devices
- Adoption of or increase in tolls
- Addition of tolled lanes, where tolls are sufficient to mitigate VMT increase
- Initiation of a new transit service
- Conversion of streets from one-way to two-way operation with no net increase in the number of traffic lanes
- Removal or relocation of off-street or on-street parking spaces
- Adoption or modification of on-street parking or loading restrictions (including meters, time limits, accessible spaces, and preferential/reserved parking permit programs)
- Addition of traffic wayfinding signage
- Rehabilitation and maintenance projects that do not add motor vehicle capacity
- Addition of new or enhanced bike or pedestrian facilities on existing streets/highways or within existing public rights-of-way
- Addition of Class I bike paths, trails, multi-use paths, or other off-road facilities that serve nonmotorized travel
- Installation of publicly available alternative fuel/charging infrastructure
- Addition of passing lanes, truck climbing lanes, or truck brake-check lanes in rural areas that do not increase overall vehicle capacity along the corridor

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Additionally, transit and active transportation projects generally reduce VMT and, therefore, may be presumed to cause a less than significant impact on transportation. This presumption may apply to all passenger rail projects, bus and bus rapid-transit projects, and bicycle and pedestrian infrastructure projects. The City may use this CEQA presumption of less than significant impact to aid in the prioritization of capital projects, as the CEQA process for any of these project types would be more streamlined than other capacity-enhancing capital projects.

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4.0 SIGNIFICANCE THRESHOLDS FOR DEVELOPMENT PROJECTS

The TA states that SB 743 and all CEQA VMT transportation analyses refer to automobiles. Here, the term automobile refers to on-road passenger vehicles, specifically cars and light duty trucks (page. 4). Heavy-duty trucks can be addressed in other CEQA sections (air quality, greenhouse gas, noise, and health risk assessment analysis) and are subject to regulation in a separate collection of rules under CARB jurisdiction. This approach was amplified by Chris Ganson, Senior Advisor for Transportation at OPR, in a recent presentation at the Fresno COG (October 23, 2019) and by Ellen Greenberg, the California Department of Transportation (Caltrans) Deputy Director for Sustainability, at the San Joaquin Valley Regional Planning Agencies' Directors' Committee meeting (January 9, 2020).

The OPR has identified the subject of the thresholds as the primary trips in the home-based typology: specifically, home-based work tours. This includes residential uses, office uses, and retail uses. The home-based work tour type is the primary tourmaking during the peak hours of commuter traffic in the morning and evening periods.

The impact of transportation has shifted from congestion to climate change, and the purpose of the CEQA analysis is to disclose and ultimately reduce GHG emissions by reducing the number and length of automobile trips. As part of the SB 375 land use/transportation integration process and the GHG goal setting, the State and Regional Transportation Planning Agencies (RTPA) have agreed to reduce GHG through integrated land use and transportation planning by a statewide average of approximately 15 percent by 2035. Figure 8 illustrates the SB 375 regional GHG emission reduction targets for all the 18 Metropolitan Planning Organizations (MPOs) in California that was established by the CARB in 2018. Furthermore, in its 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals, the CARB recommends total VMT per capita rates approximately 15 percent below existing conditions.

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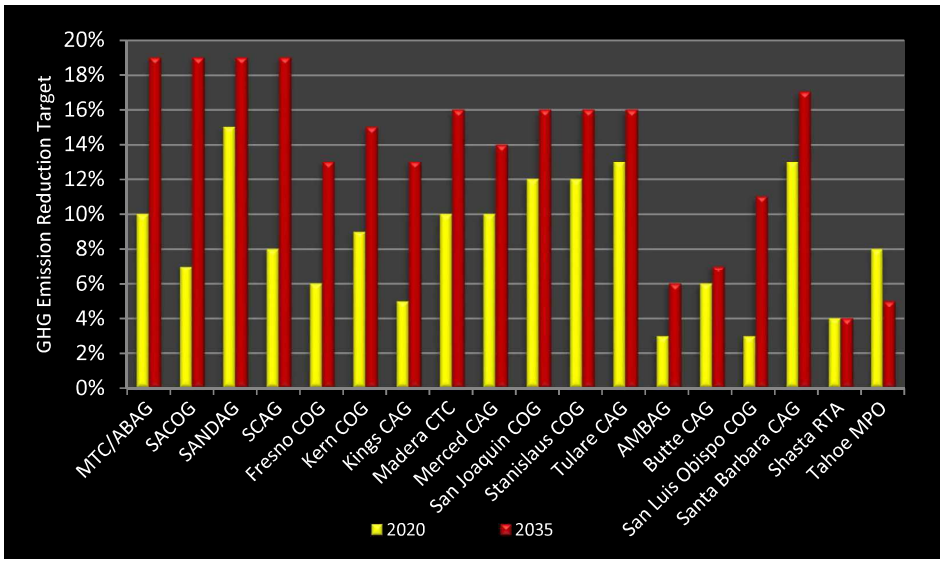
The TA therefore recommends:

> *A proposed (residential) project exceeding a level of 15 percent below existing regional average VMT per capita may indicate a significant transportation impact.*
>
> *A similar threshold would apply to office projects (15 percent below existing regional average VMT per employee).*
>
> *VMT generated by retail projects would indicate a significant impact for any net increase in total VMT.*



Source: https://ww2.arb.ca.gov/our-work/programs/sustainable-communities-program/regional-plan-targets

Figure 8: SB 375 Regional Plan Climate Targets for the 18 California MPOs

It is noted that the aggregate GHG emission reduction sought after by CARB in the SB 375 protocols is 15 percent statewide. This is one reason OPR believes the 15 percent reduction in VMT is appropriate. The aggregate 15 percent GHG emission reduction applies across all land use and transportation activities and would indicate that the State and its individual MPOs are compliant with the SB 375 goals, the overall State climate change strategy, and Scoping Plan objectives.

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CARB establishes GHG targets for each of the 18 MPOs in the State, reviews the SCSs and makes a determination whether the SCS would be able to achieve GHG reduction targets if implemented. Fresno COG's 2018 RTP/SCS demonstrated a GHG reduction of 10 percent by 2035 through the integrated land use and transportation initiatives and capital projects listing, which meets targets set by the CARB. Fresno COG's 2018 RTP/SCS was approved by all reviewing Federal and State authorities, including the CARB. In the spring of 2018, CARB adopted new GHG targets for all the 18 MPOs in the State based on the 2017 Scoping Plan and other new data. CARB established a 13 percent GHG reduction target for 2035 for the Fresno region's third RTP/SCS. The State of California recognizes Fresno County's contribution to the aggregate 15 percent statewide GHG emission reduction is 13 percent. Other regions may achieve greater reductions to achieve the aggregate statewide goal.[5] As such, reduction in GHG directly corresponds to reduction in VMT. In order to reach the statewide GHG reduction goal of 15 percent, the City must reduce GHG by 13 percent. The method of reducing GHG by 13 percent is to reduce VMT by 13 percent as well.

[5] The latest GHG targets by region can be found at: https://ww2.arb.ca.gov/our-work/programs/sustainable-communities-program/regional-plan-targets.

Therefore, the City has established a threshold for land use developments, specifically residential and office, of 13 percent or more than the existing regional VMT per capita as indicative of a significant environmental impact.

No other discrete land use types are identified for threshold development. Mixed-use projects should be evaluated for each component of the project independently, or the City may use the predominant land use type for the analysis. The City will make a determination of the predominant land use type on a case-by-case basis based on the project description. Credit for internal trip capture should be made. Internal trip capture may be calculated using the latest edition of the Institute of Transportation Engineers (ITE) *Trip Generation Handbook* (for smaller projects), the Fresno COG ABM (for larger projects), or other applicable sources approved by the City. The TA suggests that City may, but is not required to, develop thresholds for any other use.

One approach is to review the City's General Plan and/or the Fresno COG RTP/SCS and identify whether the implementation of the plan would result in a reduction of VMT and GHGs. If it does, the City may conclude the implementation of the plan, including all the other land use types will achieve the regional climate change goals. Therefore, consistency with the plan and no net change in VMT per employee for the other land use types is a rational threshold. However, for projects seeking a GPA, a project exceeding a level of 13 percent than the existing County average VMT per employee would indicate a significant transportation impact.

This approach would require disclosure of substantial evidence, including the General Plan findings, and other supporting traffic and air quality forecasting support. Additionally, if the City wishes to establish some other threshold less stringent than the 13 percent recommended for residential and office projects, a body of substantial evidence would be necessary.

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Figure 9 demonstrates the potential development entitlement process to comply with the *State CEQA Guidelines* related to VMT and transportation impacts. It provides the path from application filing through determination of impacts. It is presented as the standard process; each development application is considered unique and may create alternative or modified steps through the process. Each step that diverges from this standard process should be accompanied with substantial evidence demonstrating compliance with other climate change and GHG emission reduction laws and regulations.

4.1 GENERAL TRANSPORTATION ANALYSIS PROCEDURE

This process will be refined as the new VMT analysis process is implemented. At the outset of the project development process, the applicant should seek a meeting with City staff to discuss the project description, the transportation study content, and the analysis methodology. Key elements to address include a description of the project in sufficient detail to generate trips and identify the potential catchment area (i.e., trip lengths if no modeling is undertaken), estimate project VMT, discuss project design features that may reduce the VMT from the project development, and discuss the project location and associated existing regional VMT percentages. As a result of the meeting, the applicant or their consultant shall prepare a transportation analysis scope of work for review and approval by the City.

Projects that will influence Caltrans facilities may be subject to the Caltrans Local Development-Intergovernmental Review program. As part of the program, Caltrans may review the VMT analysis methodology, findings, and mitigation measures, with an eye toward statewide consistency.

4.2 PROJECT SCREENING

Once a development application is filed and the meeting is held, project screening is conducted as the initial step. If the project meets any one of the screening criteria, the project may be presumed to create a less than significant impact. No further VMT analysis is necessary. The CEQA document should enumerate the screening criteria and how the project meets or exceeds that threshold. If project screening does not apply, a VMT analysis may be required. The extent of this analysis may be a simple algebraic demonstration or a more sophisticated traffic modeling exercise. This distinction is addressed later.

4.3 PROJECT VEHICLE MILES TRAVELED ANALYSIS

The first step is to identify the project land use type and the appropriate metric to use, i.e., VMT per capita, VMT per employee, or total VMT. The metric should be VMT per capita for residential projects, VMT per employee for office projects, and total VMT for retail projects. For mixed-use projects, after taking credit for internal trip capture, the project VMT can be estimated based on each component of the project independently, or the City may use the predominant land use type for the analysis. For all other uses, the metric used should be VMT per employee.

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4.3.1 Small Project Vehicle Miles Traveled Analysis

Project VMT may be calculated using the Fresno COG VMT Calculation Tool[6] for residential projects having less than or equal to 500 dwelling units or office projects having less than or equal to 375 employees. For all other projects, trip lengths can be determined using the Fresno COG ABM.

4.3.2 Large Project Vehicle Miles Traveled Analysis

For large or multi-use projects, use of the Fresno COG ABM is required. For purposes of City review, all projects, other than residential uses with less than or equal to 500 dwelling units or offices with less than or equal to 375 employees, should use the Fresno COG ABM. At this level of trip generation, the probability of trip fulfilment expands to an area greater than the immediate project location and may include a greater regional attraction. The Fresno COG ABM can more accurately define the select links used and the total VMT generated by the project.

Next, the project generated VMT per capita/VMT per employee/total VMT is compared to the appropriate significance threshold. This is either equal to or more than 13 percent of the existing regional average per capita or employment for specific uses, or no net increase in total VMT for retail or other uses that are consistent with the General Plan. For those projects that require a GPA, a threshold of 13 percent or more than existing regional average is appropriate as the project has yet to be evaluated as part of the City's ultimate development vision.

[6] Fresno COG VMT Calculation Tool Link: https://www.fresnocog.org/project/sb743-regional-guidelines-development/

If the project VMT metric is less than the significance threshold, the project is presumed to create a less than significant impact. No further VMT analysis is required. If the project is greater than the significance threshold, mitigation measures are required.

4.4 MITIGATION MEASURES

The applicant is required, per CEQA, to identify feasible offsets to completely mitigate the impact created by the project. These can come from the mitigation strategies provided by the City (Appendices A and B), or selected based on the applicant and their CEQA team experience. The City must approve and accept the ultimate mitigation ascribed to the project and the related VMT percentage reduction.

If the mitigation measures mitigate the project impact to less than the jurisdictional threshold, the project is presumed to have an impact mitigated to a less than significant level. No further VMT analysis is required. If the project's VMT impact cannot be mitigated, the City may 1) request the project be redesigned, relocated or realigned to reduce the VMT impact, or 2) require the preparation of an Environmental Impact Report (EIR) with a Statement of Overriding Considerations (SOC) for the transportation impacts associated with the project. All feasible mitigation measures must be assigned to and carried out by the project even if an EIR/SOC is prepared.

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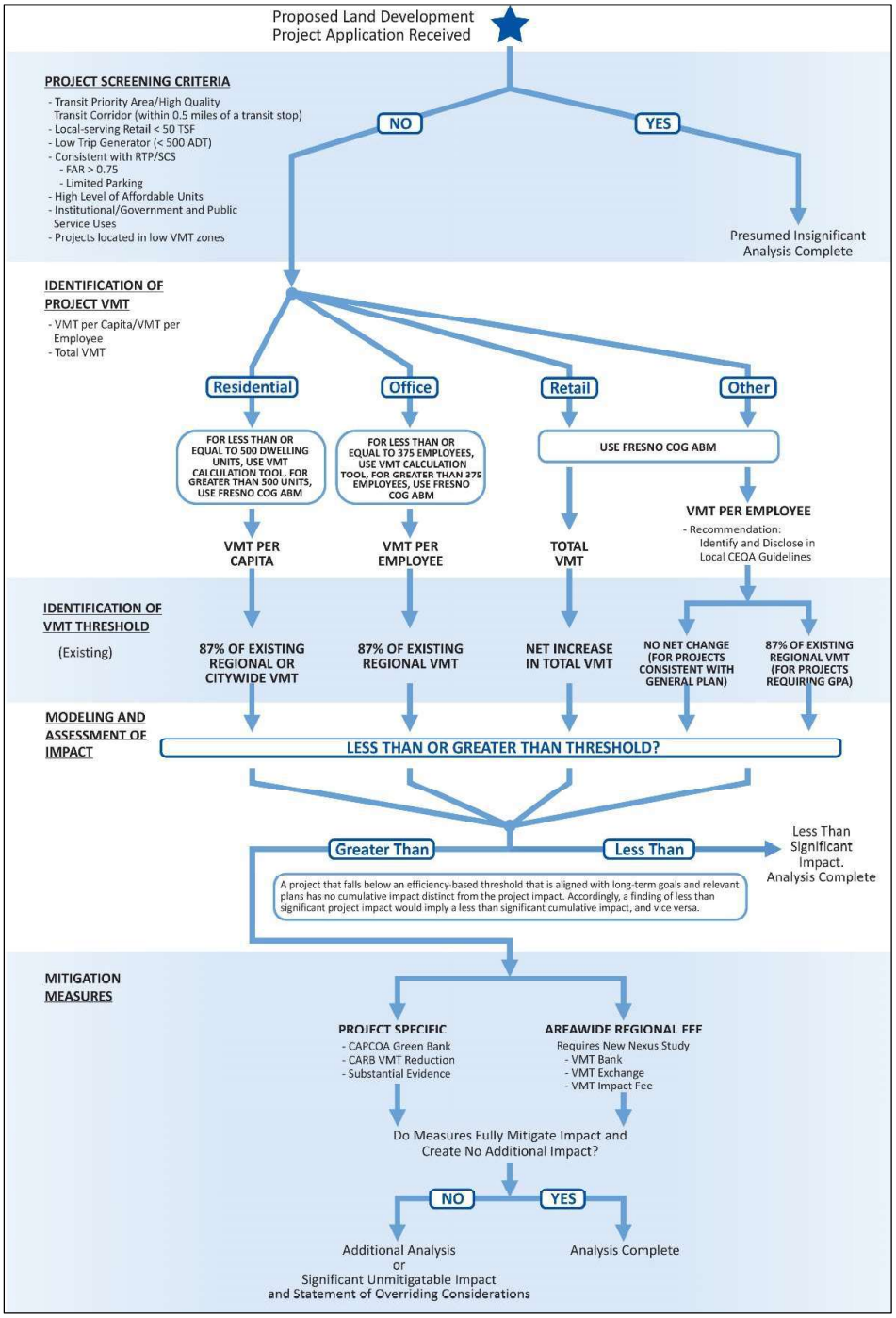

Figure 9: VMT Analysis Process for Development Projects

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5.0 SIGNIFICANCE THRESHOLDS FOR TRANSPORTATION PROJECTS

The 2020 CEQA Guidelines include Section 15064.3.b.(2) to address transportation projects. It reads:

> *For roadway capacity projects, agencies have the discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements.*

The City may continue to use delay and LOS for transportation projects for design and traffic operation purposes as long as impacts related to "other applicable requirements" are disclosed. This has generally been interpreted as VMT impacts and other State climate change objectives. These other applicable requirements may be found in other parts of an environmental document (i.e., air quality, GHG), or may be provided in greater detail in the transportation section.

For projects on the State highway system, the Caltrans will use and will require sponsoring agencies to use VMT as the CEQA metric, and Caltrans will evaluate the VMT "attributable to the project" (Caltrans Draft VMT-Focused Transportation Impact Study Guide 2020). Caltrans may review environmental documents for capacity-enhancing projects for the City's analysis of VMT change.

The assessment of a transportation project's VMT should disclose the VMT without the project and the difference in VMT with the project. Any growth in VMT attributable to the transportation project would result in a significant impact.

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The primary difference in these two scenarios to OPR is related to induced growth. Current traffic models have limited abilities to forecast induced growth, as their land use or socioeconomic databases are fixed to a horizon date. OPR refers to a limited set of reports that would indicate elasticities.

The most recent major study (Duranton & Turner 2011, p. 24), estimates an elasticity of 1.0, meaning that every 1 percent change in lane miles results in a 1 percent increase in VMT.

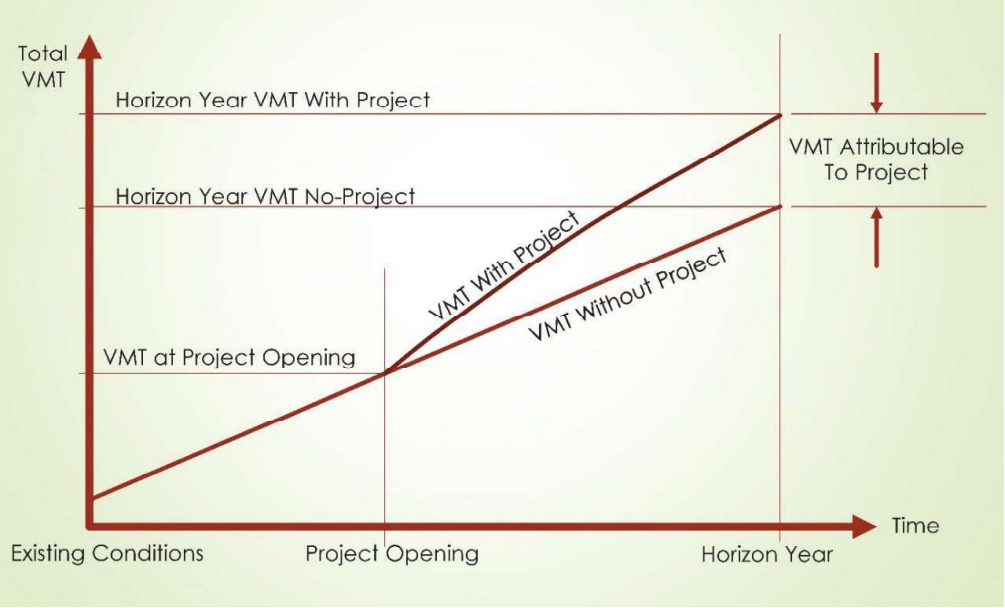
The TA presents one method to identify the induced growth, as follows.

> *To estimate VMT impacts from roadway expansion projects:*
>
> 1. *Determine the total lane-miles over an area that fully captures travel behavior changes resulting from the project (generally the region, but for projects affecting interregional travel look at all affected regions).*
> 2. *Determine the percentage change in total lane miles that will result from the project.*
> 3. *Determine the total existing VMT over that same area.*

4. *Multiply the percentage increase in lane miles by the existing VMT, and then multiply that by the elasticity from the induced travel literature:*

[% increase in lane miles] x [existing VMT] x [elasticity] =
[VMT resulting from the project]

Figure 10 provides a representative illustration of induced VMT attributable to a project.



Source: Presentation: Caltrans Transportation Analysis under CEQA or TAC: Significance Determinations for Induced Travel Analysis (SHCC Pre-Release Session 2 Jeremy Ketchum, Division of Environmental Analysis, Caltrans; March 2, 2020)

Figure 10: Induced Travel – VMT Attributable to Project

Caltrans has identified a computerized tool that estimates VMT generation from transportation projects. It was developed at University of California, Davis and is based on elasticities and the relationship of lane mile additions and growth in VMT. It uses Federal Highways Administration definitions of facility type and ascribes VMT increases to each facility. Output includes increases on million miles of VMT per year. Caltrans is investigating its use for all its VMT analyses of capital projects on the State Highway System. Figure 11 provides an illustration of that tool.

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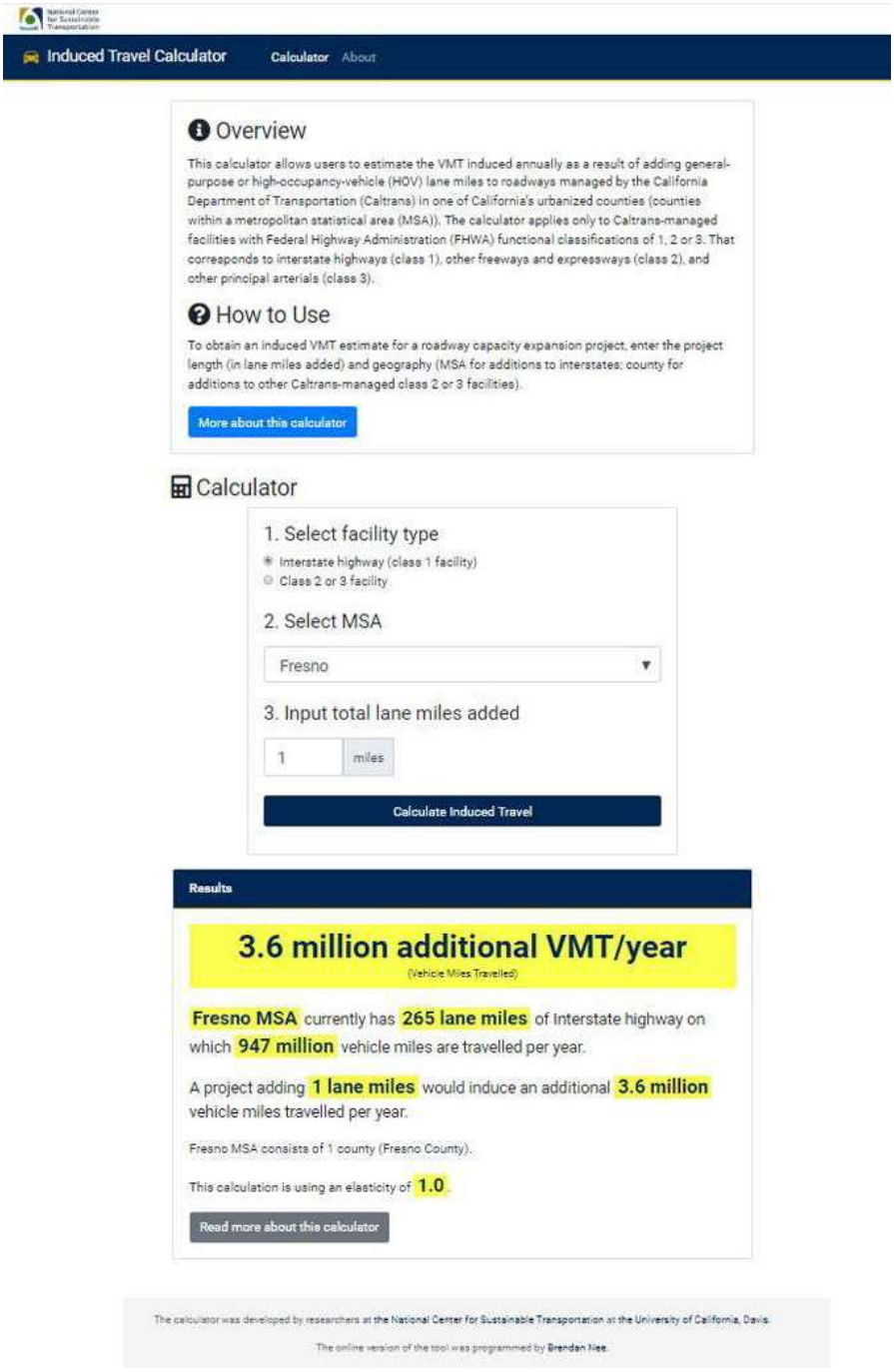

Source: https://blinktag.com/induced-travel-calculator/index.html

Figure 11: Caltrans Induced Travel Calculator

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The TA provides other options to identify induced growth- and project-related VMT. These include:

1. Employ an expert panel. *An expert panel could assess changes to land use development that would likely result from the project. This assessment could then be analyzed by the travel demand model to assess effects on vehicle travel. Induced vehicle travel assessed via this approach should be verified using elasticities found in the academic literature.*

2. Adjust model results to align with the empirical research. *If the travel demand model analysis is performed without incorporating projected land use changes resulting from the project, the assessed vehicle travel should be adjusted upward to account for those land use changes. The assessed VMT after adjustment should fall within the range found in the academic literature.*

3. Employ a land use model, running it iteratively with a travel demand model. *A land use model can be used to estimate the land use effects of a roadway capacity increase, and the traffic patterns that result from the land use change can then be fed back into the travel demand model. The land use model and travel demand model can be iterated to produce an accurate result.*

The TA provides a final warning:

> *Whenever employing a travel demand model to assess induced vehicle travel, any limitation or known lack of sensitivity in the analysis that might cause substantial errors in the VMT estimate (for example, model insensitivity to one of the components of induced VMT described above) should be disclosed and characterized, and a description should be provided on how it could influence the analysis results. A discussion of the potential error or bias should be carried into analyses that rely on the VMT analysis, such as greenhouse gas emissions, air quality, energy, and noise.*

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Fresno COG ran a few test scenarios of roadway widening projects using the Fresno COG ABM. These results were compared with the results from the Caltrans Induced Travel Calculator. The comparison demonstrated substantial difference in results. As such, it was identified that the ABM was more sensitive to project location, roadway type, surrounding land uses, and localized trip characteristics. Therefore, for most transportation projects that are not under Caltrans jurisdiction, it is recommended that the Fresno COG ABM be utilized to calculate project related induced VMT. As illustrated in Figure 10, VMT attributable to the project must be calculated by evaluating no project and with project conditions under the horizon year scenario using Fresno COG ABM. Net increase in induced VMT will result in a significant impact for the proposed project.

The concept of induced demand and the methodology to be followed is explained in greater detail in the Technical Appendices. Figure 12 illustrates a conceptual overview of the methodology to be followed to calculate induced demand. As illustrated in Figure 12, the effect of induced VMT will be required to be evaluated from both a land use and a travel demand modeling perspective. Fresno COG staff and the Resource Systems Group, Inc. (RSG) have prepared a detailed process that needs

to be conducted for this analysis. The methodology looks at induced VMT from new land uses generated by transportation capacity improvement projects by providing iterative and incremental feedback between the Fresno COG ABM and the land-use growth allocation model such that changes in the traffic network are incorporated into land-use allocation, and vice-versa. The methodology then looks at the impact of increased roadway capacity on increased traffic volumes and congestion using DaySim, the activity-based model component of the Fresno COG ABM. The methodology concludes that roadway capacity increase may lead to increased volumes, which results in increased congestion, which could be close to or the same as the congestion before the roadway capacity increase, albeit with more vehicles and an overall increase in utility.

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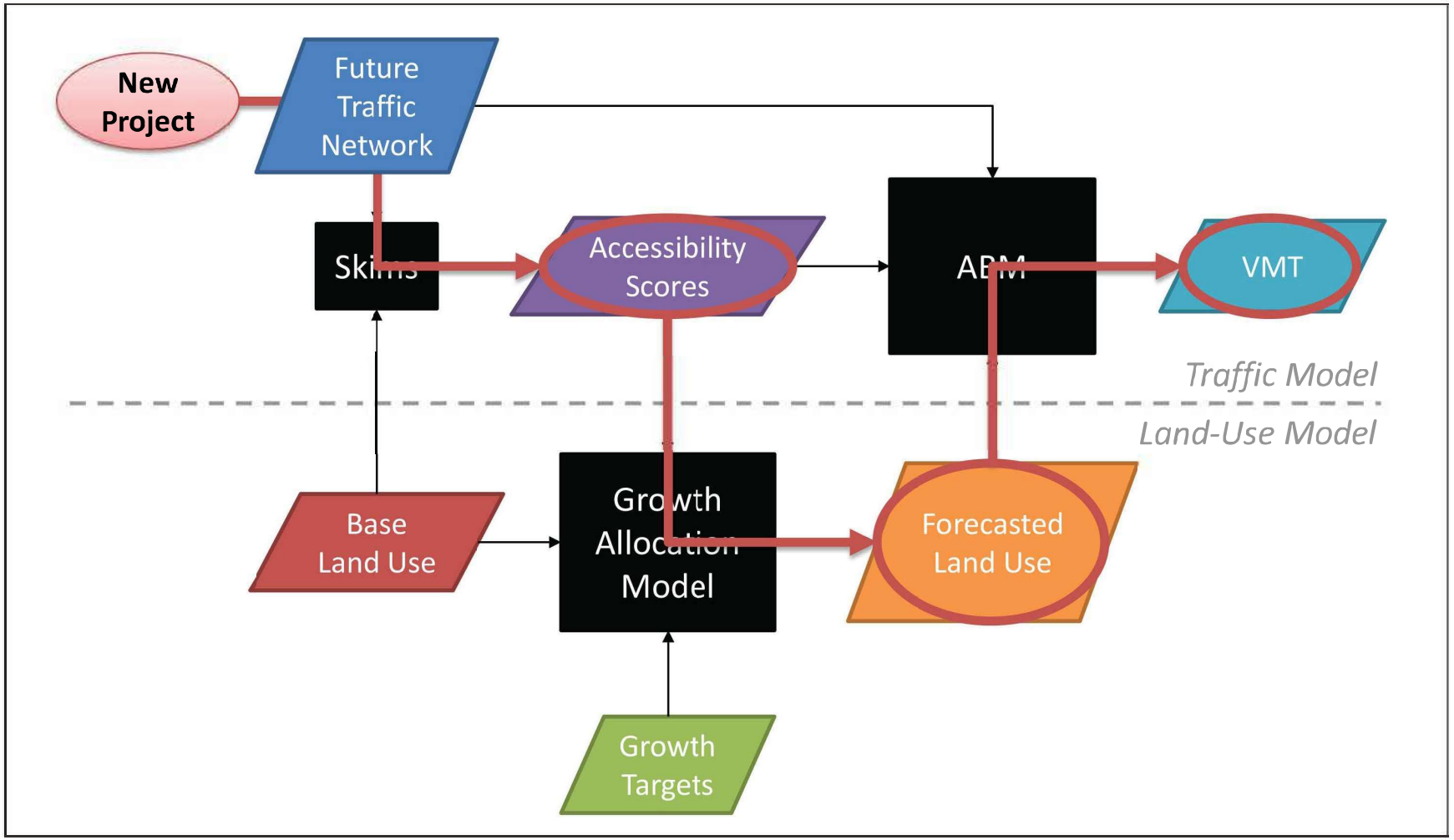

LSA

FIGURE 12

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CEQA Guidelines for Vehicle Miles Traveled Thresholds

Conceptual Methodology for Calculating Induced Demand for Transportation Projects

SOURCE: Fresno Council of Governments

I:\FCG1901\Reports\Traffic\fig13_InducedVMTMethodology_05-28-2020.ai (05/28/2020)

6.0 SIGNIFICANCE THRESHOLDS FOR LAND USE PLANS

The OPR guidance has provided guidance on the treatment of CEQA traffic analyses for land use plans in the TA. The TA reiterates previous direction regarding individual land use assessments:

- Analyze the VMT outcomes over the full area over which the plan may substantively affect travel patterns (the definition of region).
- VMT should be counted in full rather than split between origins and destinations (the full impact of the project VMT).

The TA provides a single sentence as consideration for land use plans. It states, "A general plan, area plan, or community plan may have a significant impact on transportation if proposed new residential, office or retail land uses would in aggregate exceed the respective thresholds recommended above." This recommendation refers to a threshold of 13 percent or more than the existing regional average for residential and office uses and no net gain for retail land uses.

To assess a land use plan, use of a traffic-forecasting tool is recommended. Therefore, the City should use the ABM to assess VMT for land use plans. The total VMT for the plan should be identified for all tour types and all potential VMT contributors within the plan area. Model runs should be conducted for the existing base year and the horizon year with project (plan).

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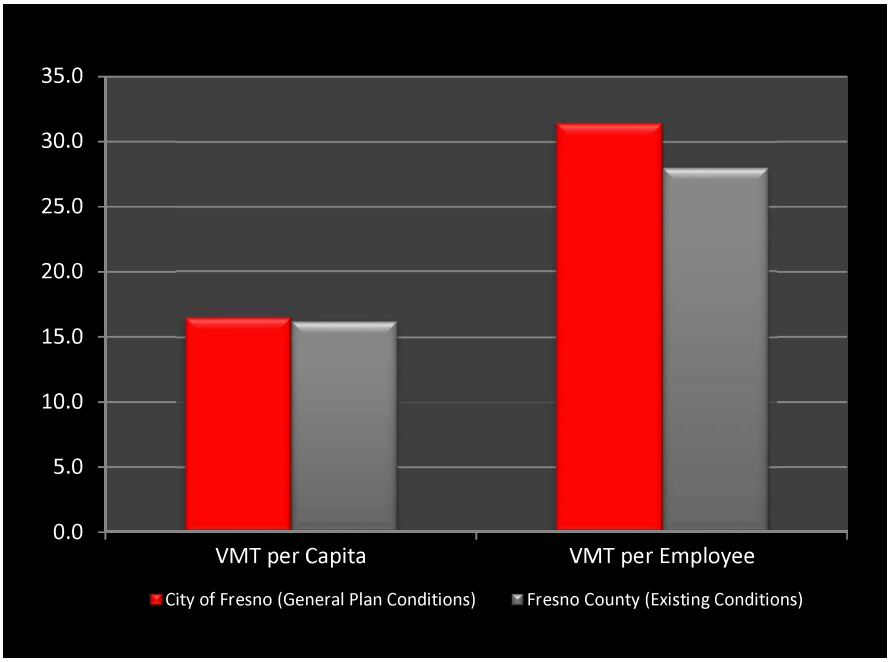
The SB 375 process establishes ambitious and achievable GHG reduction targets for the 18 MPOs in the State. The achievements of the targets are provided through the integration of land use planning and transportation planning, not solely through the imposition of regulation on passenger cars and light-duty trucks. The CARB reviews the SCS and the strategies and programs that the regional agencies put in place in the SCS to achieve the GHG reduction. The CARB approved the new GHG reduction targets for all the 18 MPOs in the State in the spring of 2018. The 2018 targets are applicable to the third SCSes for the MPOs.

Other legislative mandates and State policies speak to GHG reduction targets. A sample of these include:

- Assembly Bill 32 (2006) requires statewide GHG emissions reductions to 1990 levels by 2020 and continued reductions beyond 2020.
- SB 32 (2016) requires at least a 40 percent reduction in GHG emissions from 1990 levels by 2030.
- Executive Order (EO) B-30-15 (2015) sets a GHG emissions reduction target of 40 percent below 1990 levels by 2030.
- EO S-3-05 (2005) sets a GHG emissions reduction target of 80 percent below 1990 levels by 2050.

- EO B-16-12 (2012) specifies a GHG emissions reduction target of 80 percent below 1990 levels by 2050 specifically for transportation.

Therefore, the recommended methodology for conducting VMT assessments for land use plans is to compare the existing VMT per capita and/or VMT per employee for the region with the expected horizon year VMT per capita and/or VMT per employee for the land use plan. If there is a net increase in the VMT metric under horizon year conditions, then the project will have a significant impact. Figure 13 illustrates the comparison of VMT per capita and VMT per employee under the horizon year for the City of Fresno General Plan compared to the existing regional VMT per capita and existing VMT per employee, respectively.



Source: Fresno COG Activity Based Model

Figure 13: VMT per Capita and VMT per Employee Comparisons – City of Fresno General Plan versus Fresno County under Existing Conditions

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7.0 MITIGATION STRATEGIES

When a lead agency identifies a significant CEQA impact according to the thresholds described above, the agency must identify feasible mitigation measures in order to avoid or substantially reduce that impact. Although previous LOS impacts could be mitigated with location-specific LOS improvements, VMT impacts will require mitigation of regional impacts through more behavioral changes. Enforcement of mitigation measures will be still be subject to the mitigation monitoring requirements of CEQA, as well as the regular police powers of the agency. These measures can also be incorporated as a part of plans, policies, regulations, or project designs.

7.1 DEFINITION OF MITIGATION

Section 15370 of the *2020 State CEQA Guidelines* defines mitigations as follows:

> *"Mitigation" includes:*
>
> *a. Avoiding the impact altogether by not taking a certain action or parts of an action.*
>
> *b. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.*
>
> *c. Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.*
>
> *d. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.*
>
> *e. Compensating for the impact by replacing or providing substitute resources or environments, including through permanent protection of such resources in the form of conservation easements.*

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Section 15097 of the *State CEQA Guidelines* states that "the public agency shall adopt a program for monitoring or reporting on the revisions which it has required in the project and the measures it has imposed to mitigate or avoid significant environmental effects."

VMT mitigations may not be physical improvements; rather, they are complex in nature and will significantly depend on changes in human behavior. Therefore, it will be important that the City develop a proper monitoring program to ensure the implementation of these mitigation measures, throughout the life of a project, in compliance with CEQA. The City must also coordinate with other responsible agencies as part of this monitoring program to determine the feasibility of the mitigations and whether they would last in perpetuity.

Historically, mitigation measures for LOS based transportation impacts have addressed either trip generation reductions or traffic-flow-capacity enhancements. LOS mitigation measures include adding capacity to intersections, roadways, ramps, and freeways. However, transportation demand

management (TDM) actions, active transportation amenities, and other measures to reduce the number of trips creating an impact are also possible mitigation strategies.

LOS based mitigations are mostly physical improvements whose benefits are observable, measurable, and virtually perpetual. The addition of a left-turn lane at an intersection will behave similarly regardless of location and will continue to perform as intended until the lane is removed or modified. A lane mile of roadway will carry a similar volume of traffic if designed consistently across most jurisdictions in California, and it will continue to do so as long as the lane exists.

The definition of VMT mitigation measures is somewhat different. Most VMT mitigations may seem feasible from a theoretical perspective, but practical implementation of these strategies as formal CEQA mitigation measures in perpetuity is yet to be tested. Several of these mitigations are contextual and behavioral in nature. Their success will depend on the size and location of the project as well as expected changes in human behavior. For example, a project providing a bike share program does not necessarily guarantee a behavioral change within the project's population; the level of improvement may be uncertain and subject to the whim of the population affected.

LOS mitigations (such as addition of turn lanes) focus more on rectifying a physical CEQA impact (strategy "c" of *State CEQA Guidelines* Section 15370). On the contrary, the majority of VMT mitigations (such as commute trip-reduction programs) will aim at reducing or eliminating an impact over time through preservation and monitoring over the life of the project (strategy "d" of *State CEQA Guidelines* Section 15370). Additionally, some VMT mitigations (such as those focused on land use/location-based policies) will aim at minimizing impacts by reducing the number of trips generated by the projects (strategy "b" of *State CEQA Guidelines* Section 15370).

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Furthermore, it may be that identified VMT impacts cannot be mitigated at the project-specific level. Most VMT impacts are in the context of the region of analysis. The incremental change in VMT associated with a project in the particular setting in which it may be located would suggest a greater VMT deficit than individual strategies can offset. Only a regional solution (e.g., completion of a transit system, purchase of more transit buses, or gap closure of an entire bicycle master plan system) may offer the incremental change necessary to reduce the VMT impact to a level of insignificance. Also, VMT, as a proxy for GHG emissions, may not require locational specificity. A project does not necessarily need to diminish the VMT at the project site to gain benefit in VMT and GHG reduction in the State. Offsets in an area where the benefit would be greater will have a more effective reduction in VMT and GHG and contribute to the State's ultimate climate goals. This is the basis for the cap-and-trade strategies.

These issues of regional scale, partial participation, and geographic ambiguity confound the certainty of the City's identification of VMT mitigation measures. Section 15126.4 of the *State CEQA Guidelines* states, "Where several measures are available to mitigate an impact, each should be discussed and the basis for selecting a particular measure should be identified. **Formulation of mitigation measures shall not be deferred until some future time** [emphasis added]." Certainty does not yet exist that partial participation in VMT mitigation measures is permissible. Regional VMT mitigation is considered the most effective method for large-scale VMT reduction, yet the cost and implementation barriers are greater in most cases than one project can undertake. The only

exception may be where VMT mitigation strategies are provided at a regional level in the form of mitigation banks, fees, and exchanges and the projects are subject to contribute to these fee programs consistent with applicable provision to ensure compliance and consistency with CEQA and other legal requirements.

Section 21099 (b) (4) of the PRC states, "This subdivision [requiring a new transportation metric under CEQA] does not preclude the application of local general plan policies, zoning codes, conditions of approval, thresholds, or any other planning requirements pursuant to the police power or any other authority." Hence, despite the fact that automobile delay will no longer be considered a significant impact under CEQA, the City can still require projects to meet the LOS standards designated in its zoning code or general plan. Therefore, in that case, the project might still be required to propose LOS improvements for congestion relief in addition to VMT strategies as CEQA mitigation measures.

7.2 MITIGATION MEASURES AND PROJECT ALTERNATIVES

7.2.1 Development Projects and Community/General Plans

Mitigations and project alternatives for VMT impacts have been suggested by the OPR and are included in the TA. VMT mitigations can be extremely diverse and can be classified under several categories such as land use/location, road pricing, transit improvements, commute trip reduction strategies, and parking pricing/policy. However, the issue with VMT mitigations is the quantitative measurement of the relief provided by the strategies. How much VMT reduction does a TDM program, a bike share program, a transit route, or 1 mile of sidewalk provide? Improvements related to VMT reduction strategies have been quantified in sources such as the California Air Pollution Control Officers Association (CAPCOA) report *Quantifying Greenhouse Gas Mitigation Measures* (CAPCOA Green Book) and CARB sources, and are generally presented in wide ranges of potential VMT reduction percentages.

Source: https://abc30.com/3126364/

Bus Rapid Transit in the City of Fresno

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Appendix A is a summary of the different VMT mitigation measures and project alternatives stated in the CAPCOA Green Book (only those strategies directly attributed to transportation) and the OPR TA for development projects. It also refers to mitigation measures listed in other sources such as the VMT Measurement Calculator for the City of Los Angeles, the transportation analysis guidelines for the City of San Jose and the San Diego Region, and the memorandum Analysis of VMT Mitigation Measures Pursuant to SB 743, prepared by Iteris, Inc., for the Los Angeles County Metropolitan Transportation Authority.

Appendix B provides a list of mitigations for development projects based on the research work performed by Deborah Salon, Marlon G. Boarnet, Susan Handy, Steven Spears, and Gil Tal with the support of CARB. For a few mitigation measures, Fresno COG staff conducted additional research as applicable to the Fresno COG region using the Fresno COG ABM and locally available empirical data. Based on that analysis, specific VMT reduction percentages were developed for these mitigation measures. A detailed description of this analysis is provided in the *Fresno County SB 743 Implementation Regional Guidelines.* The City recommends applying these values to provide project-related mitigations. For all other mitigation measures, the project applicant will be required to provide substantial evidence while identifying a project-specific value. In case that information is not available, consistent with the Fresno COG's recommendations, the project should apply the low point of provided ranges for VMT reduction. Where a mitigation strategy does not have an identified VMT reduction range, the project applicant would be required to provide a reduction estimate supported by evidence.

Source: https://www.fresno.gov/publicworks/wp-content/uploads/sites/17/2016/09/170022FresnoATPFinal012017.pdf

Bike Routes in the City of Fresno

As for land use plans, the potential mitigation measures for community/general plans would be similar to those for development projects, with certain modifications. The OPR TA does not specifically state any VMT mitigations for land use plans. However, the transportation impact study guidelines for the San Diego Region list potential mitigation measures. These measures have been summarized in Appendix C along with corresponding VMT reduction percentages obtained from CAPCOA.

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It must be noted that Appendices A–C provide only summaries of the mitigations stated in the sources mentioned above. The reader should refer to the original source for further details and for subsequent updates to the mitigation measures. Also, Appendices A–C do not provide an exhaustive list of mitigation measures to offset the CEQA impacts. Other measures can also be accepted by the City based on provision of substantial evidence.

As additional mitigation measures are developed to offset VMT impacts in the future for the *State CEQA Guidelines* process, linkages between the strategy and the incremental effect and quantified offset must be made. This can be based on other sources' observations and measurements or the City's experience in these practices. The key to mitigation is to base its efficacy on real and substantial evidence.

7.2.2 Transportation Projects

Although OPR provides detailed guidance on how to assess induced-growth impacts associated with transportation projects, it leaves the subject of mitigation measures vague. Only four strategies are suggested as mitigation measures:

- Tolling new lanes to encourage carpools and fund transit improvements
- Converting existing general-purpose lanes to HOV or HOT lanes
- Implementing or funding off-site travel demand management
- Implementing Intelligent Transportation Systems strategies to improve passenger throughput on existing lanes

Source: https://medium.com/@davidcanepa/toll-lanes-good-for-the-rich-bad-for-the-environment-4f1ec24105d3

Toll Lanes

No quantified reduction percentage is allocated to these strategies, and LSA could find no substantial evidence that would provide guidance to levels of significance after implementation of these strategies. Review of the four recommended strategies suggests that OPR is directing strategies away from general-purpose mixed-flow lanes on expressways, freeways, and arterial highways. Inasmuch as these are the project descriptions and Purpose and Need, the project intent and the project mitigation may be at odds. The City would be subject to an SOC for the capital project VMT impact.

7.3 FUNDING MECHANISMS

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The change in the metric for transportation impacts from LOS to VMT will lead to a shift in impacts and mitigation measures from being local and project-specific to being more regional in nature. OPR acknowledges the regional nature of VMT impacts and states that regional VMT reduction programs and fee programs (in-lieu fees and development impact fees) may be appropriate forms of mitigation. Fee programs are particularly useful to address cumulative impacts. It is very important for the City to coordinate with the RTPA or Fresno COG to develop such mitigation programs that would fund transit, develop active transportation plans, etc. These programs are regional in nature and best suited for administration by the regional agency. Regional agencies may also wish to coordinate with appropriate stakeholders, including participating local jurisdictions, developers, and other interests while conducting nexus studies and checking for rough proportionality and compliance with CEQA.

Most of the VMT mitigations included in Appendix A are applicable in urban areas. They are less effective in suburban and rural contexts, where TDM strategies may become diluted or are not applicable. Thus, site-specific strategies are more suitable in urban areas, whereas program-level strategies are more suitable for projects in suburban/rural areas. In the latter approach, cumulative contributions for development mitigations can pay for VMT reduction strategies that would not be feasible for the individual projects to implement themselves. Apart from fee programs, program-based mitigation approaches may include mitigation exchanges and mitigation banks. The mitigation exchange concept requires a developer to implement a predetermined project that would reduce VMT in order to propose a new one. On the other hand, the concept of mitigation banks seeks to establish monetary values for VMT reductions so that developers can purchase VMT reduction credits.

As previously stated, VMT impacts are more regional in nature. Hence, there might be requirements for mitigations outside the control of the City, and without consent from the agency controlling the mitigations, the impacts might remain significant and unavoidable. Additionally, identification of regional improvements where projects can contribute their fair share to mitigate impacts might prove to be difficult. Therefore, LSA recommends that the City work collaboratively within its regions to ultimately establish fee programs, mitigation banks, and exchanges as the most efficient way to establish a regional mitigation pathway where the projects can contribute. Procedural flow charts for VMT banks, exchanges, and impact fees are illustrated at the end of this chapter.

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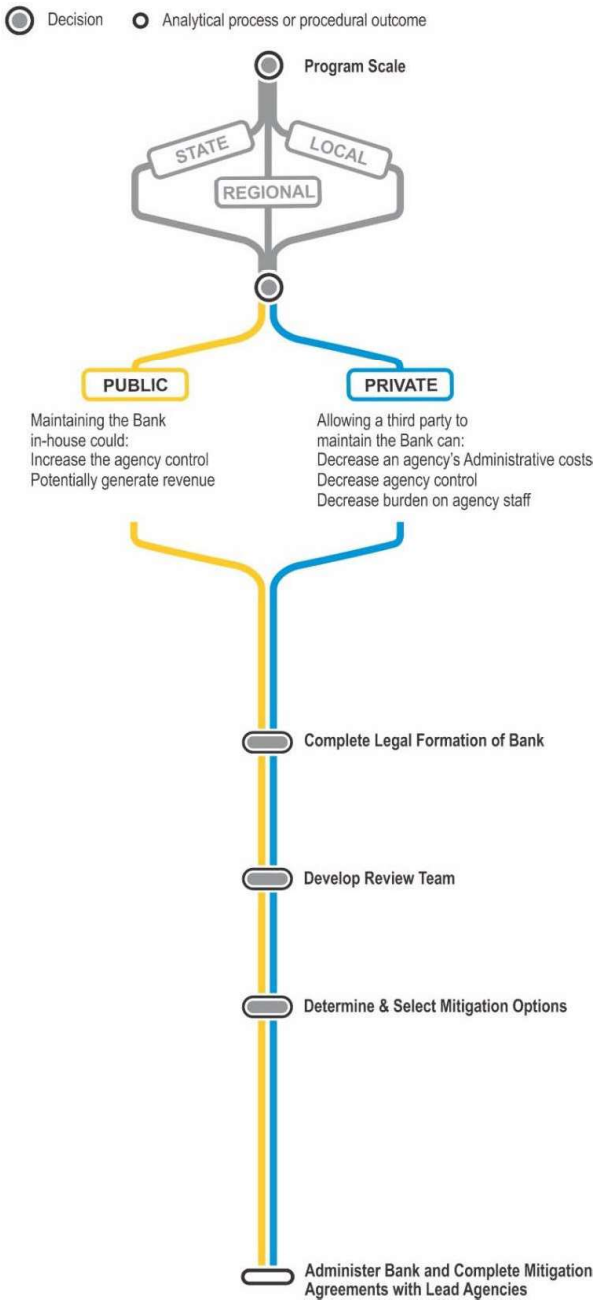
Procedural Flow Chart – VMT Bank



Source: VMT Mitigation Through Banks and Exchanges: Understanding New Mitigation Approaches. A White Paper by Fehr & Peers (January 2020).

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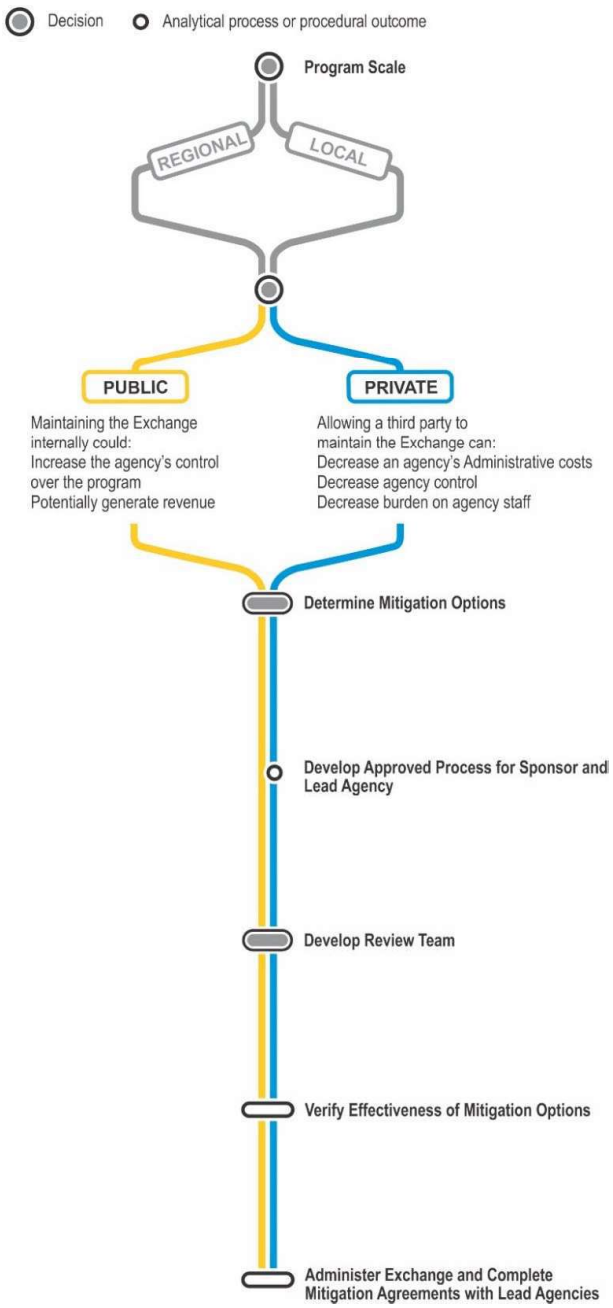
Procedural Flow Chart – VMT Exchange



Source: VMT Mitigation Through Banks and Exchanges: Understanding New Mitigation Approaches. A White Paper by Fehr & Peers (January 2020).

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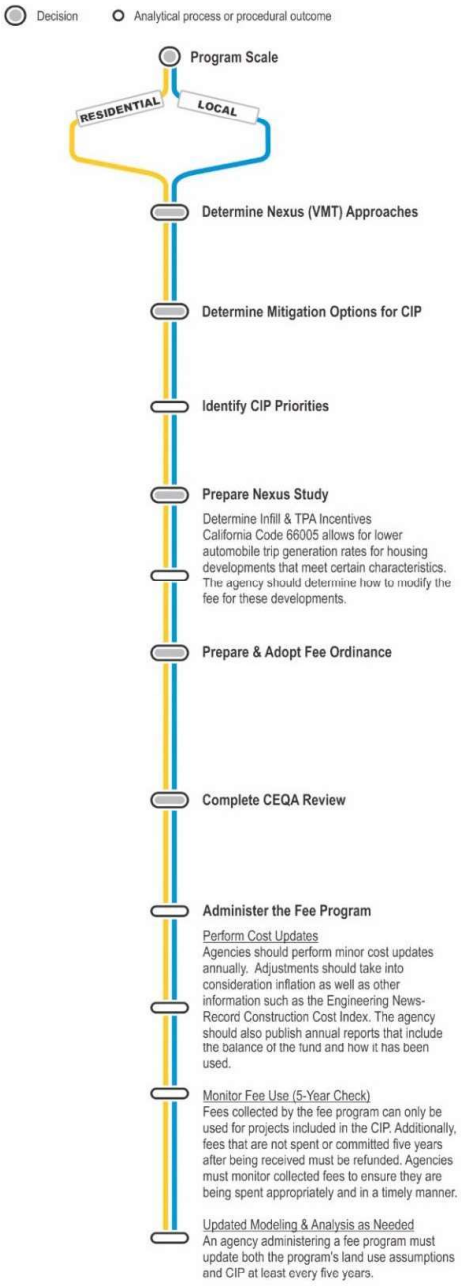
Procedural Flow Chart – VMT Impact Fee



Source: Understanding New Mitigation Approaches. A White Paper by Fehr & Peers (January 2020).

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APPENDIX A

VEHICLE MILES TRAVELED MITIGATION MEASURES FOR DEVELOPMENT PROJECTS (CAPCOA)

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Table A - Vehicle Miles Traveled Mitigation Measures for Development Projects (CAPCOA)

	VMT Reduction[1]	Local VMT Reduction Calculations (Local Data/Fresno COG ABM)[2]	CAPCOA[3]	OPR TA[4]	Los Angeles Metro[5]	City of San Jose[6]	City of Los Angeles[7]	San Diego Region[8]	Notes
it System (Addition of a New Route)	0.02% – 3.20%	0.33% VMT reduction per 100 miles	Y	Y	Y	N	N	Y	Notes: CAPCOA TST -1 (Applicable in urban and suburban conte appropriate for specific or general plans). This can be considere Measure 'Improve pedestrian or bicycle networks, or transit se
it System (Substitution of an Existing Bus Route with a BRT Route)	0.02% – 3.20%	0.20% VMT reduction per 100 miles	Y	Y	Y	N	N	Y	Notes: CAPCOA TST -1 (Applicable in urban and suburban conte appropriate for specific or general plans). This can be considere Measure 'Improve pedestrian or bicycle networks, or transit se
	0.30% - 13.40% commute VMT	0.60%	Y	Y	N	Y	N	Y	Notes: Similar to CAPCOA TRT -11 (Provide Employer-Sponsored in urban, suburban, and rural context; appropriate for office, ir projects). The measure is included under the Technical Advisor or subsidies that increase the use of modes other than single-o Jose [Applicable for employment uses only]
vehicle trips to carpooling or vanpooling, for atching or shuttle services	0.30% - 13.40% commute VMT reduction (for CAPCOA TRT-11: Provide Employer-Sponsored Vanpool/Shuttle); 7.20% - 15.80% school VMT reduction (for CAPCOA TRT-10: Implement a School Pool Program)	0.60% (for vanpool); x% (for carpool)	Y	Y	Y	Y	Y	Y	Notes: Similar to CAPCOA TRT -11 (Provide employer-sponsored measure is applicable for urban, suburban, and rural context, a industrial, and mixed-use projects; Similar measure is CAPCOA Pool Program: Applicable for urban, suburban, and rural contex residential and mixed-use projects); City of San Jose [School ca uses only)]; City of LA [School carpool program - level of implen Employer sponsored vanpool or shuttle (Degree of implementa employees eligible (%), employer size (small, medium, large)]
	0.10% – 8.20%	0.07% VMT reduction per 100 miles (for addition of a new transit line)	Y	Y	Y	Y	Y	Y	Notes: CAPCOA TST -3; Measure applicable in urban and suburb in rural context but no literature documentation available, app plans. This can be considered under Technical Advisory Measu bicycle networks, or transit service'; City of San Jose [Increase t last-mile transit connections; Improve network connectivity/de low-carbon travel modes accessible; both applicable for both r uses]; City of LA [Existing transit mode share (as a percent of to project site improved (<50%, >=50%)]
et design (on-site)	1% increase in share of workers commuting by bicycle (for each additional mile of bike lanes per square mile) (*Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Them, Commuters Will Use Them – Another Look* by Dill and Carr (2003)); 0.075% increase in bicycle commuting with each mile of bikeway per 100,000 residents (*If You Build Them, Commuters Will Use Them; Cross-Sectional Analysis of Commuters and Bicycle Facilities* by Nelson and Allen (1997))	0.30% VMT reduction per 100 miles (for addition of new bike lane)	Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT -5 [Grouped strategy, benefits of Bike Lane should be grouped with the LUT-9 (Improve Design of Develop street network characteristics and enhance multi-modal envirc applicable in urban and suburban contexts and is appropriate f industrial, and mixed-use projects. This can be considered und 'Improve pedestrian or bicycle networks, or transit service'; Cit of bike access with investment in infrastructure: applicable for employment uses]; City of LA [Provide bicycle facility along site
s to transit	CAPCOA TST-2: Not quantified alone, grouped strategy with TST-3 'Expand transit network' and TST-4 'Increase transit service frequency/speed'; CAPCOA LUT-5: 0.50% - 24.60%	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA TST -2: Implement Transit Access Improvement suburban context, and appropriate for residential, retail, office projects); CAPCOA LUT-5: Increase Transit Accessibility [May be measures LUT-3 (mixed use development), SDT-2 (traffic calme connectivity), and PPT-1 through PPT-7 (parking management s applicable in urban and suburban contexts; appropriate in rura adjacent to a commuter rail station with convenient rail service center; appropriate for residential, retail, office, industrial, and San Jose [Increase transit accessibility to improve last-mile trar network connectivity/design to make destinations and low-car both applicable for both residential and employment uses]; Cit share (as a percent of total daily trips) (%), Lines within project
n goods and services, such as groceries, schools, and daycare	Similar to CAPCOA LUT-3 (Increase Diversity of Urban and Suburban Developments (Mixed Use)): 9.00% - 30.00% VMT reduction and CAPCOA LUT-4 (Increase Destination Accessibility): 6.70% - 20.00% VMT reduction	N/A	Y	Y	Y	Y	N	Y	Notes: Similar to CAPCOA LUT -3 (Increase Diversity of Urban ar (Mixed Use) - Applicable in urban and suburban context; negligi project is a master-planned community; appropriate for mixed 4 (Applicable in urban and suburban context, negligible in rural residential, retail, office, industrial, and mixed-use projects); Ci Neighborhood Schools: Applicable for residential uses only]; Ci measure 'Increase diversity of uses' - Applicable for residential
using into the project	0.04% - 1.20%	N/A	Y	Y	Y	Y	N	Y	Notes: Similar measure is CAPCOA LUT -6 [Integrate Affordable Housing] - [Applicable in urban and suburban contexts; negligib unless transit availability and proximity to jobs/services are exi appropriate for residential and mixed-use projects]; City of San 'Integrate affordable and market rate housing] - Measure is ap only

Table A - Vehicle Miles Traveled Mitigation Measures for Development Projects (CAPCOA)

	VMT Reduction[1]	Local VMT Reduction Calculations (Local Data/Fresno COG ABM)[2]	CAPCOA[3]	OPR TA[4]	Los Angeles Metro[5]	City of San Jose[6]	City of Los Angeles[7]	San Diego Region[8]	Notes
d electric vehicle network	0.50% - 12.70%	N/A	Y	Y	Y	N	N	Y	Notes: CAPCOA SDT -3 [Neighborhood electric vehicles (NEV) w therefore reduce the traditional vehicle VMT and GHG emissio available NEV network and support facilities, NEV ownership le from traditional; measure is applicable in urban, suburban, and citywide or large multi-use developments, and appropriate for
nsit, bicycle, and pedestrian facilities	`1) 0.25% - 0.5% (0.25% reduction is attributed for a project oriented towards a planned corridor and 0.5% reduction is attributed for a project oriented towards an existing corridor) (as per the Sacramento Metropolitan Air Quality Management District (SMAQMD) *Recommended Guidance for Land Use Emission Reductions*), 2) 0.5% reduction in VMT per 1% increase in transit frequency and per 10% increase in transit ridership (as per the Center for Clean Air Policy (CCAP) *Transportation Emission Guidebook*)	N/A	Y	Y	Y	N	N	Y	Notes: CAPCOA LUT -7 [Orient project toward non-auto corrido 3 (Increase Diversity of Urban and Suburban Developments (M evidence that the measures results in non-negotiable trip redu other measures, including neighborhood design, density and di accessibility and pedestrian and bicycle network improvements urban or suburban context (may be applicable in a master-plan appropriate for residential, retail, office, industrial, and mixed
rk improvements	0.00% - 2.00%	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT -1 [applicable in urban, suburban, and rura residential, retail, office, industrial, and mixed-use projects; rec the project has both pedestrian network improvements on site off-site network]. This can be considered under Technical Advis pedestrian or bicycle networks, or transit service'; City of San J network improvements for active transportation: applicable fo employment uses]; City of LA [Included (within project and con only)]
equency/speed	0.02% – 2.50%	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA TST -4, applicable in urban and suburban contex context but no literature documentation available, appropriate This can be considered under Technical Advisory Measure 'Imp networks, or transit service'; City of San Jose [Similar to measu service upgrades']; City of LA [Reduction in headways (increase
tions to transportation infrastructure improvement projects	Not Quantified: Grouped strategy (with RPT-2 and TST-1 through 7)	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA RPT -3 (Applicable in urban, suburban and rural residential, retail, office, mixed use, and industrial projects); m measures discussed above. This can be considered under Techn 'Improve pedestrian or bicycle networks, or transit service.'
ssibility	6.70% – 20.00%	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA LUT -4 [Destination accessibility measured in te other attractions reachable within a given travel time, which te locations and lowest at peripheral ones; the location of the pro potential for pedestrians to walk and bike to these destinations applicable for urban and suburban contexts, negligible impact i for residential, retail, office, industrial, and mixed-use projects] Technical Advisory Measure 'Improve pedestrian or bicycle net of San Jose [Increase transit availability to improve last-mile tra network connectivity/design to make destinations and low-car both applicable for both residential and employment uses]; Cit site improved (<50%, >=50%)]
easures	0.25% – 1.00%	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT -2 [applicable in urban, suburban, and rura residential, retail, office, industrial, and mixed-use projects]; Ci both residential and employment uses]; City of LA [Streets with (%), intersections with traffic calming improvements (%)]
n-residential projects	0.625% (as per the Center for Clean Air Policy (CCAP) *Transportation Emission Guidebook*)	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT -6 [Bike Parking in Non-Residential projects standalone strategy and should be grouped with the LUT-9 (Im strategy to encourage bicycling by providing strengthened stre bicycle facilities]; the measure is applicable in urban, suburban appropriate for retail, office, industrial, and mixed-use projects parking and end-of-trip facilities such as bike parking, bicycle lo lockers (Applicable for both residential and employment uses)] parking/lockers, showers, & repair station (Y/N)]
multi-unit residential projects	Not Quantified	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT -7 [Grouped Strategy; the benefits of Bike P Residential Projects have no quantified impacts and should be (Improve Design of Development) strategy to encourage bicycl street network characteristics and bicycle facilities. The measu suburban, or rural contexts. It is appropriate for residential pro [Provide bike parking and end-of-trip facilities such as bike parl and personal lockers (Applicable for both residential and emplo [Include bike parking/lockers, showers, & repair station (Y/N)]

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supply	5.00% - 12.50%	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA PDT -1 (applicable in urban and suburban conte appropriate for residential, retail, office, industrial, and mixed- counted only if spillover parking is controlled (via residential pe parking); follow multi-faceted strategy including 1) elimination requirements, 2) creation of maximum parking requirements, a parking; City of San Jose [Decrease project parking supply at th than the standard parking minimums where allowable in the Sa (applicable for employment uses)]; City of LA [City code parkin parking provision (spaces)]
om property costs	2.60% - 13.00%	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA PDT -2 (applicable in urban and suburban conte appropriate for residential, retail, office, industrial and mixed-u strategies include workplace parking pricing); City of San Jose [Costs: Application for Residential Uses Only]; City of LA [Month
programs	0.60% – 7.70% commute VMT	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT -15 [Implement employee parking "cash-ou to describe the employer providing employees with a choice of subsidized/free parking for a cash payment equivalent to the c employer. The measure is applicable in urban and suburban co rural context; it is appropriate for retail, office, industrial, and m are applied only if complementary strategies are in place: a) Re market rate public on-street parking to prevent spill over parki not required but provides a market signal to employers to forg "cash-out" the employee instead. In addition, unbundling park employers can utilize as a means of establishing "cash-out" pri cash-out: Employment uses only]; City of LA [Parking cash-out:
ess to a commute reduction program - Voluntary	1.00% - 6.20% commute VMT	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT -1: Commute Trip Reduction Program – Vol program that encompasses a combination of individual measu measures TRT-3 through TRT-9. It is presented as a means of p reductions for individual measures that are included in this stra maximum level of reductions that should be permitted for a co a voluntary program. The main difference between a voluntary Monitoring and reporting is not required B) No established performance standards (i.e. no trip reductio is applicable in urban and suburban contexts, negligible in a ru employers exist and suite of strategies implemented are releva measure is appropriate for retail, office, industrial, and mixed-u [Applicable for employment uses only]; City of LA [Employees a
ram	1.00% – 15.00% commute VMT	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT -3 [Provide Ride-Sharing Programs: applica context; Negligible impact in many rural contexts, but can be e in a rural area draws from a workforce in an urban or suburba employer moves from an urban location to a rural location; ap office, industrial, and mixed-use projects]; City of San Jose [Rid only]; City of LA [Measured in terms of employees eligible (%)]
ogram	0.40% – 0.70%	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT -9 [urban and suburban context, negligible appropriate for residential, retail, office, industrial, and mixed- [Applicable for both residential and employment uses]; City of (urban, suburban, all other)]
rogram	Taking evidence from the literature, a 135-300% increase in bicycling (of which roughly 7% are shifting from vehicle travel) results in a negligible impact (around 0.03% VMT reduction)	N/A	Y	Y	N	Y	Y	Y	Notes: CAPCOA TRT -12 [This measure has minimal impacts wh strategy's effectiveness is heavily dependent on the location ar programs have worked well in densely populated areas (examp and Paris) with existing infrastructure for bicycling. Bike sharing combined with Bike Lane Street Design (SDT-5) and Improve De The measure is applicable in urban and suburban-center conte context; appropriate for residential, retail, office, industrial, an San Jose [Bike share for employment and residential uses]; City feet of existing bike share station - OR -implementing new bike
	Similar to CAPCOA TRT-4 [Implement Subsidized or Discounted Transit Program]; for TRT-4, commute VMT reduction is 0.30% - 20.00%	N/A	Y	Y	Y	Y	Y	Y	Notes: Similar to CAPCOA TRT -4 [Implement Subsidized or Disc of San Jose [Implement Subsidized or Discounted Transit Progr residents eligible (%), amount of transit subsidy per daily passe

Table A - Vehicle Miles Traveled Mitigation Measures for Development Projects (CAPCOA)

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program	7.20% - 15.80% school VMT reduction	N/A	Y	Y	N	Y	Y	Y	Notes: CAPCOA TRT -10 [This project will create a ridesharing pr Most school districts provide bussing services to public schools parents to transport students to private schools, or to schools bike but do not meet the requirements for bussing. The measu suburban, and rural context and is appropriate for residential a San Jose [School carpool program - residential uses only)]. This under the Technical Advisory Measure 'Shifting single occupan vanpooling, for example providing ride matching services.'; City - level of implementation (low, medium, high)
e service	CAPCOA TST-6 (Provide Local Shuttles): Not Quantified; 0.30% - 13.40% commute VMT reduction (for CAPCOA TRT-11: Provide Employer-Sponsored Vanpool/Shuttle)	N/A	Y	Y	N	Y	Y	Y	Notes: CAPCOA TST -6 (Provide Local Shuttles - grouped strateg Parking Near Transit' and TST-4 'Increase Transit Service Freque urban/suburban context; appropriate for large residential, reta industrial projects; solves the "first mile/last mile" problem; CA employer-sponsored vanpool/shuttle) - the measure is applica rural context, and is appropriate for office, industrial, and mixe can be considered under the Technical Advisory Measure 'Shift trips to carpooling or vanpooling, for example providing ride m Jose [Employment uses only]; City of LA [Employer sponsored v implementation (low, medium, high), employees eligible (%), e large)]
ns	0.07% - 5.50% commute VMT	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT -6 [Applicable in urban, rural, and suburbar retail, office, industrial, and mixed-use projects]; City of San Jos and telecommute (employment land uses only)]; City of LA [Alt telecommute (employees participating (%), type of program)]
rvice upgrades	Not Quantified	N/A	Y	Y	N	Y	N	Y	Notes: Similar to CAPCOA TST -2 through TST-4; City of San Jose through contributions to the transit provider to improve transi frequency and number of routes); applicable for both residenti measure is included under the Technical Advisory Measure 'Pro that increase the use of modes other than single-occupancy ve
discounted transit program	0.30% – 20.00% commute VMT	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT -4 [Implement subsidized or discounted tra applicable in urban and suburban context, negligible in a rural residential, retail, office, industrial, and mixed-use projects); Th subsidized/discounted daily or monthly public transit passes. T free transfers between all shuttles and transit to participants. T wholly subsidized by the employer, school, or development. M parking to offset the cost of such a project. The measure is incl Advisory Measure 'Provide incentives or subsidies that increase single-occupancy vehicle.'; City of San Jose [Implement Subsidi Program]; City of LA [Transit subsidies measured by employees amount of transit subsidy per passenger (daily equivalent) ($)]
es at places of work, such as priority parking for carpools and vanpools, showers and locker rooms	22% increase in bicycle mode share (UK National Travel Survey)/2%-5% reduction in commute vehicle trips (*Transportation Demand Management Encyclopedia*)/0.625% reduction in VMT (*Center for Clean Air Policy (CCAP) Emission Guidebook*)	N/A	Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT -5 [Provide End of Trip Facilities]: End-of-tri impacts when implemented alone. This strategy's effectiveness traveled (VMT) depends heavily on the suite of other transit, pe management measures offered. End-of trip facilities should be Reduction (CTR) Programs (TRT-1: Implement Commute Trip Re through TRT-2: Implement Commute Trip Reduction Program – Implementation/Monitoring) and TRT-3 (Provide Ride-Sharing [Similar measures include 'Provide bike parking/end of trip bike sharing programs']; City of LA [Include bike parking/lockers, sh
rtation coordinators at employment sites	Not Quantified	N/A	Y	Y	Y	N	N	Y	ncluded as part of CAPCOA TRT -1 (Implement Commute Trip R
home service to users of non-auto modes	Not Quantified	N/A	N	Y	Y	N	N	Y	
of the region that already exhibits low VMT	10.00% - 65.00%	N/A	Y	Y	Y	N	N	Y	Notes: CAPCOA LUT -2 (Applicable in urban and suburban conte contexts; appropriate for residential, retail, office, industrial, a
t	0.50% - 24.60%	N/A	Y	Y	Y	N	N	Y	Notes: CAPCOA LUT -5 [May be grouped with CAPCOA measure development), SDT-2 (traffic calmed streets with good connect (parking management strategies); measures are applicable in u appropriate in rural context if development site is adjacent to a convenient rail service to a major employment center; appropr office, industrial, and mixed-use projects]
nent density	1.50% - 30.00%	N/A	Y	Y	Y	Y	N	Y	Notes: CAPCOA LUT -1 (Applicable in urban and suburban conte context; appropriate for residential, retail, office, industrial, an San Jose [Applicable for both residential and employment uses
within the project or within the project's surroundings	9.00% - 30.00%	N/A	Y	Y	Y	Y	N	Y	Notes: CAPCOA LUT -3: Increase Diversity of Urban and Suburba [Applicable in urban and suburban context, negligible in rural c mixed-use projects]; City of San Jose [Applicable for both reside

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ivity and/or increase intersection density on the project site	Similar measure is CAPCOA LUT-9 [Improve Design of Development]: 3.0% - 21.3% reduction in VMT	N/A	Y	Y	Y	Y	N	Y	Notes: Similar measure to CAPCOA LUT -9 (Improve Design of D [Build new street connections and/or connect cul-de-sacs to pr access: applicable for both residential and employment uses]
	0.10% - 19.70% commute VMT	N/A	Y	N	N	Y	Y	N	Notes: CAPCOA TRT -14 [Urban and suburban context; Negligibl Appropriate for retail, office, industrial, and mixed-use project complementary strategies are in place: o Residential parking permits and market rate public on-street parking o Unbundled parking - is not required but provides a market sig over the, now explicit, cost of parking to the employees. In add provides a price with which employers can utilize as a means o parking prices; City of San Jose [Price On-Site Workplace Parkir City of LA [Daily parking charge ($), Employees subject to price
ath/bike lane	0.625%	N/A	Y	N	Y	N	N	N	Notes: CAPCOA LUT -8 (Grouped strategy with 'Increase Destina measure is most effective when applied in combination of mult encourage this use; strategy should be grouped with 'Increase strategy to increase the opportunities for multi-modal travel; n or suburban context, may be applicable in a rural master plann residential, retail, office, industrial, and mixed-use projects
Reduction Marketing	0.80%- 4.00% commute VMT	N/A	Y	N	Y	Y	N	N	Notes: CAPCOA TRT -7 (applicable in urban and suburban conte appropriate for residential, retail, office, industrial, and mixed- [Employment uses only]
ment - Voluntary travel behavior change program	1.00% - 6.20% commute VMT	N/A	Y	N	N	Y	Y	N	Notes: Similar to CAPCOA TRT -1 (Implement Commute Reducti of San Jose [For both residential and employment uses]; City of participating (%)]
ment - Promotions and marketing	0.80% - 4.00% commute VMT	N/A	Y	N	N	Y	Y	N	Notes: Similar to CAPCOA TRT -7 [Implement Commute Reducti [Similar measure might be 'Implement commute trip reduction campaign' (applicable for employment uses)]; City of LA [Emplo participating (%)]
shuttle	Not Quantified	N/A	Y	N	N	Y	Y	N	Notes: CAPCOA TST-6 (Provide Local Shuttles - grouped strateg Parking Near Transit' and TST-4 'Increase Transit Service Freque urban/suburban context; appropriate for large residential, reta industrial projects; solves the "first mile/last mile" problem; Cit 'Operate a free direct shuttle service' (applicable for employme [Degree of Implementation (low/medium/high), employees an
	Two sources: 0.10% - 0.50% VMT reduction (as per 2005 Federal Highway Administration (FHWA) study) and 0.50% VMT reduction per day (as per Washington State Department of Transportation (WSDOT))	N/A	Y	N	N	N	N	N	Notes: CAPCOA RPT -4 (Applicable in suburban and rural contex retail, office, mixed use, and industrial projects); Grouped strat and TRT-1 through 6
d/or require idling-reduction systems	26% - 71% reduction in Truck refrigeration units (TRU) idling GHG emissions	N/A	Y	N	N	N	N	N	Notes: CAPCOA VT -1 (Measure applicability: Truck refrigeration
vehicles	Reduction in GHG emissions varies depending on vehicle type, year, and associated fuel economy	N/A	Y	N	N	N	N	N	Notes: CAPCOA VT -2 (Measure applicability: vehicles)
ehicles	0.40% - 20.30% reduction in GHG emissions	N/A	Y	N	N	N	N	N	Notes: CAPCOA VT -3 (Measure applicability: vehicles)
transit	Not Quantified	N/A	Y	N	N	N	N	N	Notes: CAPCOA TST-5 (should be implemented with other two encourage multi-modal use in the area and provide ease of acc bicyclists (measure applicable in urban and suburban context; retail, office, mixed use, and industrial projects); Grouped strat 'Expand transit network' and TST-4 'Increase transit service fre
pment	3.00% - 21.30%	N/A	Y	N	N	N	N	N	Notes: CAPCOA LUT -9 (Include design elements to enhance wa improved street network characteristics within a neighborhood design also measured in terms of sidewalk coverage, building s pedestrians crossings, presence of street trees, and a host of o differentiate pedestrian-oriented environments from auto-orie is applicable in the urban and suburban contexts, negligible imp appropriate for residential, retail, office, industrial, and mixed-
rking	Not Quantified	N/A	Y	N	N	N	N	N	Notes: CAPCOA SDT -8 [This is a grouped strategy and the bene may be quantified when grouped with the use of electric vehic Neighborhood Electric Vehicle (NEV) Network). This measure is suburban contexts and is appropriate for residential, retail, offi projects.]

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ails	Not Quantified	N/A	Y	N	N	N	N	N	Notes: CAPCOA SDT -9 [Larger projects may be required to prov dedicate land for the provision of off-site bicycle trails linking t bicycle commuting routes in accordance with an adopted cityw plan. The benefits of Land Dedication for Bike Trails have not b grouped with the LUT-9 (Improve Design of Development) stra network characteristics and improve connectivity to off-site bic applicable in urban, suburban, or rural contexts and is appropr office, mixed use, and industrial projects.]
gram	38.00% - 63.00% school VMT reduction	N/A	Y	N	N	N	N	N	Notes: CAPCOA TRT -13 [Applicable in urban, suburban, and rur residential and mixed-use projects]
arking permit program	Not Quantified	N/A	Y	N	N	N	N	N	Notes: CAPCOA TRT -8 [The project will provide preferential par (such as near public transportation or building front doors) in t parking fees, priority parking, or reserved parking for commute share or use alternatively fueled vehicles. The project will prov accommodate vanpool vehicles. The impact of preferential par been quantified by the literature and is likely to have negligible alone. This strategy should be grouped with Commute Trip Red and TRT-2) and TRT-3 (Provide Ride-Sharing Programs) as a cor encouraging non-single occupant vehicle travel. This measure i suburban contexts and is appropriate for residential, retail, offi projects.]

APCOA = California Air Pollution Control Officers Association; ; Fresno COG = Fresno Council of Governments; OPR = Office of Planning and Research; TA = Technical Advisory; HOV = High Occupancy Vehicle; HOT = High Occupancy Toll; ITS = Intelligent Transportation System

on Categories (LU = Land Use/Location, SD = Neighborhood/Site Enhancements, PD = Parking Policy/Pricing, TR = Commute Trip Reduction Programs, TS = Transit System Improvements, RP = Road Pricing/Management; V = Vehicles)

ed from *Quantifying Greenhouse Gas Mitigation Measures* published by the California Air Pollution Control Officers Association in August 2010.

mmendation for this measure obtained based on analysis conducted by Fresno COG staff and LSA using local data and/or the COG's Activity Based Model.

tigation Measures published by the California Air Pollution Control Officers Association in August 2010.

Transportation Impacts in CEQA published by the Governor's Office of Planning and Research State of California in December 2018.

sures Pursuant to SB 743 prepared by Iteris, Inc. in February 2018.

Analysis Handbook (dated April 2018).

or Version 1.2

pact Studies in the San Diego Region developed by San Diego Section of the Institute of Transportation Engineers (ITE) and the San Diego Traffic Engineers Council (SANTEC) in January 2019.

ed VMT Reduction Numbers are yet to be Finalized**

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CONT

APPENDIX B

VEHICLE MILES TRAVELED MITIGATION MEASURES FOR DEVELOPMENT PROJECTS (CARB PAPERS)

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CONT

Table B - Vehicle Miles Traveled Mitigation Measures for Development Projects (CARB Papers)[1]

Measure	VMT Reduction[2]	Local VMT Reduction Calculations (Local Data/Fresno COG ABM)[3]	Notes
ycling Network Improvements	No effect on VMT	0.30% VMT reduction per 100 miles (for addition of new bike lane)	
Transit Improvements	No effect on VMT	0.07% VMT reduction per 100 miles (for addition of a new transit line)	
increase access to transit	1.3% - 5.8%	N/A	Variable: Various factors associated with proximity to transit stop (please refe *Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D Handy, S., Spears, S., and Tal, G.)
ix	Elasticity: 0.02 - 0.10	N/A	Variable: Entropy - variety and balance of land-use types within a neighborho
cessibility	Elasticity: 0.05 - 0.25	N/A	Variable: Various factors associated with job accessibility and distance to CBD *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* Boarnet, M.G., Handy, S., Spears, S., and Tal, G.)
Balance	Elasticity: 0.06 - 0.31 for commute VMT	N/A	Variable: Various factors associated with job accessibility (please refer to *How Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M Spears, S., and Tal, G.)
estrian Network Improvements	Elasticity: 0.00 - 0.02 for sidewalk length, 0.19 for Pedestrian Environment Factor	N/A	
ravel Behavior Change (VTBC) Program	5% - 12%	N/A	
Employer-Based Trip Reduction (EBTR) Program	1.33% - 6% of commute VMT	N/A	
commuting options	Home-based telecommuting: 48.1% for household VMT, 66.5% - 76.6% for all personal VMT, and 90.3% for commute VMT only; Center-based telecommuting: 53.7% - 64.8% for all personal VMT and 62.0% - 77.2% for commute VMT only	N/A	
ject/Development Density	Elasticity: <=0.07 - 0.19	N/A	Variable: residential density
work connectivity and/or increase intersection density on the project site	Elasticity: -0.46 - 0.59	N/A	Variable: Various factors associated with intersection or street density (please *Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D Handy, S., Spears, S., and Tal, G.)
Parking Cash-out Programs or Workplace Parking Pricing	12% of commute VMT (parking cash out); 2.3% - 2.9% for $3 per day workplace parking price; 2.8% for price increase equivalent to 60% hourly value of commuter travel time cost	N/A	

Miles Traveled

neasures have been obtained from *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.).

ion numbers have been obtained from *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.).

MT reduction recommendation for this measure obtained based on analysis conducted by Fresno COG staff and LSA using local data and/or the COG's Activity Based Model.

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APPENDIX C

VEHICLE MILES TRAVELED MITIGATION MEASURES FOR COMMUNITY PLANS AND GENERAL PLANS

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Table C - Vehicle Miles Traveled Mitigation Measures for Community Plans and General Plans[1]

tigation Measure	CAPCOA VMT Reduction	Local VMT Reduction Calculations (Local Data/Fresno COG ABM)[2]
ft single occupancy vehicle trips to carpooling or vanpooling by providing ride-matching services or shuttle services	0.30% - 13.40% commute VMT reduction (for CAPCOA TRT-11: (Provide Employer-Sponsored Vanpool/Shuttle)); Grouped strategy (for CAPCOA TST-6 (Provide Local Shuttles))	0.60% (for vanpool); x% (for carpoo
ovide enhanced bicycle and/or pedestrian facilities	0.00% - 2.00% (for pedestrian network improvements); Multiple measures for bike facilities, refer to Table A for VMT reduction percentages	0.30% VMT reduction per 100 mile (for addition of new bike lane)
ovide incentives or subsidies that increase the use of modes other than a single-occupancy vehicle	0.30% - 13.40% commute VMT reduction (for CAPCOA TRT-11: (Provide Employer-Sponsored Vanpool/Shuttle)); Grouped strategy (for CAPCOA TST-6 (Provide Local Shuttles)); 0.30% - 20.00% commute VMT reduction (for CAPCOA TRT-4 (Implement Subsidized or Discounted Transit Program))	0.60% (for vanpool); x% (for carpoo
odify land use plan to increase development in areas with low VMT/capita characteristics and/or decrease velopment in areas with high VMT/capita characteristics	Not quantified in CAPCOA	N/A
d roadways to the street network if those roadways would provide shorter travel paths for existing and/or future trips	Not quantified in CAPCOA	N/A
prove or increase access to transit	CAPCOA TST-2 (Implement transit access improvements): Not quantified alone, grouped strategy with TST-3 (Expand transit network) and TST-4 (Increase transit service frequency/speed); CAPCOA LUT-5 (Increase transit accessibility): 0.50% - 24.60%	N/A
rease access to common goods and services, such as groceries, schools, and daycare	Similar to CAPCOA LUT-3 (Increase Diversity of Urban and Suburban Developments (Mixed Use)): 9.00% - 30.00% VMT reduction and CAPCOA LUT-4 (Increase Destination Accessibility): 6.70% - 20.00% VMT reduction	N/A
orporate a neighborhood electric vehicle network	0.50% - 12.70%	N/A
ovide traffic calming	0.25% – 1.00%	N/A
nit or eliminate parking supply	5.00% - 12.50%	N/A

Table C - Vehicle Miles Traveled Mitigation Measures for Community Plans and General Plans[1]

tigation Measure	CAPCOA VMT Reduction	Local VMT Reduction Calculations (Local Data/Fresno COG ABM)[2]
plement or provide access to a commute reduction program - Voluntary	1.00% - 6.20% commute VMT	N/A
ovide car-sharing, bike sharing, and ride-sharing programs	0.40% - 0.70% VMT reduction (for car sharing); 1.00% - 15.00% commute VMT reduction (for ride-sharing); a 135% - 300% increase in biking (of which roughly 7% are shifting from vehicle travel) results in a negligible impact (around 0.03% VMT reduction)	N/A
ovide partially or fully subsidized transit passes	Similar to CAPCOA TRT-4 [Implement Subsidized or Discounted Transit Program]; for TRT-4, commute VMT reduction is 0.30% - 20.00%	N/A
ovide telework options	0.07% - 5.50% commute VMT	N/A
ovide employee transportation coordinators at employment sites	Not quantified in CAPCOA	N/A
ovide a guaranteed ride home service to users of non-auto modes	Not quantified in CAPCOA	N/A

T = Vehicle Miles Traveled; Fresno COG = Fresno Council of Governments; CAPCOA = California Air Pollution Control Officers Association

COA Transportation Mitigation Categories (LU = Land Use/Location, SD = Neighborhood/Site Enhancements, PD = Parking Policy/Pricing, TR = Commute Trip Reduction Programs, TS = Transit System Improvements, RP oad Pricing/Management; V = Vehicles)

mitigation measures have been obtained from the *Guidelines for Transportation Impact Studies in the San Diego Region* developed by San Diego Section of the Institute of Transportation Engineers (ITE) and the San go Traffic Engineers Council (SANTEC) in January 2019.

sno COG VMT reduction recommendation for this measure obtained based on analysis conducted by Fresno COG staff and LSA using local data and/or the COG's Activity Based Model.

****Highlighted VMT Reduction Numbers are yet to be Finalized****

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2023 Maintenance Plan and Redesignation Request for the Revoked 1-Hour Ozone Standard

Adopted June 15, 2023

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San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

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A. INTRODUCTION

Since 2014, the San Joaquin Valley Air Control District (District) has been in attainment for the revoked 1-hour ozone National Ambient Air Quality Standard (NAAQS) of 124 parts per billion (ppb). The District is the first and only region in the nation designated as an extreme nonattainment for an ozone standard to attain that standard, specifically for the 1-hour ozone NAAQS.

Since then, and through the efforts to continue to reduce emissions from stationary, area, and mobile sources, the San Joaquin Valley (Valley) has continued to experience dramatic progress in reducing ozone concentrations, keeping the region in attainment of the 1-hour ozone NAAQS, as well as progressing towards attaining the 8-hour ozone NAAQS.

In order to terminate anti-backsliding provisions for the revoked 1-hour ozone standard, including Section 185 nonattainment fees, the District must meet all five criteria of Section 107(d)(3)(E) of the CAA. This document, the *2023 Maintenance Plan and Redesignation Request for the Revoked 1-Hour Ozone Standard*, includes such requirements as well as all provisions for a maintenance plan. This Maintenance Plan also includes a demonstration that would ensure the area remains in attainment of the 1-hour ozone NAAQS through 2036. Therefore, the Valley is requesting to be redesignated to attainment for the 1-hour ozone NAAQS and requesting termination of all anti-backsliding obligations.

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A.1 BACKGROUND

EPA set the 1-hour ozone NAAQS at 124 ppb on February 8, 1979[1], and later revoked the standard in 2004 to be replaced by a more health-protective 8-hour ozone NAAQS in 1997 of 84 ppb. This standard was lowered again in 2008 to 75 ppb, and then once more in 2015 to 70 ppb.[2] When EPA revoked the 1-hour standard, it identified the revoked requirements applicable to implementation of the 1-hour standard, and those that remained in effect. EPA adopted anti-backsliding provisions to preserve existing 1-hour ozone control measures and emission reductions obligations; therefore, nonattainment areas were still obligated to meet Rate of Progress (ROP) emission reduction targets, adopt mandatory control measures, and meet any extant attainment demonstration obligations.

In October 2004, the District adopted its *Extreme Ozone Attainment Demonstration Plan (2004 Ozone Plan)* to address EPA's 1-hour ozone standard. Because EPA had revoked the 1-hour ozone standard in 2004, it did not act on this plan until 2010, when EPA approved the plan and set an attainment deadline of November 15, 2010.[3]

[1] 44 FR 8202

[2] Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards, 83 Fed. Reg. 25776-25848. (2018, June 4). (to be codified 40 CFR Part 81) https://www.govinfo.gov/content/pkg/FR-2018-06-04/pdf/2018-11838.pdf

[3] Approval and Promulgation of Implementation Plans: 1-Hour Ozone Extreme Area Plan for San Joaquin Valley, CA, 75 Fed. Reg. 44, pp. 10420-10438. (2010, March 8). (to be codified at 40 CFR Part 52) https://www.gpo.gov/fdsys/pkg/FR-2010-03-08/pdf/2010-4752.pdf

Subsequent litigation against EPA concerning the revocation of the 1-hour ozone standard resulted in court rulings clarifying specific anti-backsliding requirements to be imposed for revoked standards, including Section 185 nonattainment fees and other planning requirements. As a result of EPA's nonattainment action in 2011, the District became subject to Section 185 fees of the CAA, and the District was required to develop and implement a second 1-hour ozone attainment plan.[4] On September 19, 2013, the District submitted the *2013 Plan for the Revoked 1-Hour Ozone Standard (2013 Ozone Plan)*, which was approved by EPA on April 6, 2016.[5]

In 2013, the Valley recorded zero exceedances of the revoked 1-hour ozone NAAQS, which was a first for the region, and led to ongoing ozone improvements and further planning actions. Accordingly, on May 5, 2014, the District submitted an *Attainment Determination Request* to EPA based on 2011-2013 data.[6] The District formally requested that EPA determine that the Valley has attained the federal revoked 1-hour ozone standard and included a clean data finding demonstrating that attainment was due to permanent and enforceable emissions reductions.

However, no action was taken by EPA and the District submitted a second *Attainment Determination Request* on July 13, 2015, based on 2012-2014 data.[7] On July 18, 2016, EPA published a final action in the Federal Register to determine that the Valley had attained the 1-hour ozone standard.[8] This determination was based on sufficient, quality-assured, and certified data for the period 2012-2014.

Historically, EPA would not formally redesignate nonattainment areas for revoked NAAQS. Additionally, due to legal challenges and updated court interpretations, extreme nonattainment regions have remained subject to anti-backsliding requirements under the revoked 1-hour ozone NAAQS, such as Section 185 fees. The 2008 ozone NAAQS Implementation Rule addressed how nonattainment areas should submit a redesignation substitute, which was an alternative approach to formal redesignation for lifting anti-backsliding obligations for the revoked standards. A redesignation substitute would allow an area to shift to contingency status requirements, such as penalty fee program requirements under Section 185 of the CAA, to current ozone standards.[9]

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[4] Approval and Promulgation of Air Quality Implementation Plans; California; Determinations of Failure to Attain the One-Hour Ozone Standard; Final Rule. 76 Fed. Reg. 10, pp. 82133-82146. (2011, December 30). (to be codified 40 CFR Part 52) https://www.gpo.gov/fdsys/pkg/FR-2011-12-30/pdf/2011-33475.pdf

[5] Clean Air Plans; 1-Hour and 1997 8-Hour Ozone Nonattainment Area Requirements; San Joaquin Valley, California; Final Rule. 81 Fed. Reg. 65, pp. 19492-19495. (2016, April 5). https://www.gpo.gov/fdsys/pkg/FR-2016-04-05/pdf/2016-07668.pdf

[6] SJVAPCD. *Request for EPA Finding that the San Joaquin Valley has Attained the Federal 1-hour Ozone Standard*. May 5, 2014. Retrieved from: http://www.valleyair.org/Air_Quality_Plans/docs/2013Attainment/Cover-Letter.pdf

[7] SJVAPCD. *Request for EPA Finding that the San Joaquin Valley has Attained the Federal 1-hour Ozone Standard*. July 13, 2015. Retrieved from: http://valleyair.org/Air_Quality_Plans/1hr-Ozone-Attainment-Request-2016/Coverletter.pdf

[8] EPA. *Determination of Attainment of the 1-Hour Ozone National Ambient Air Quality Standard in the San Joaquin Valley Nonattainment Area in California*. July 18, 2016. Retrieved from: https://www.govinfo.gov/content/pkg/FR-2016-07-18/pdf/2016-16792.pdf

[9] EPA's *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements; Final Rule* (2008 ozone standard SIP requirements rule), was published in the *Federal Register* on March 6, 2015 (80 FR 12264).

However, in *South Coast Air Quality Management District v. EPA,* 882 F.3d 1138 (D.C. Cir. 2018), the court vacated certain parts of the 2008 ozone NAAQS SIP requirements rule, including the redesignation substitute, holding that the only appropriate method for requesting redesignation is to satisfy the elements of the CAA section 107(d)(3)(E).

Under the CAA per Section 185, the District has been required to impose and collect nonattainment penalty fees since the 2010 attainment deadline for the 1-hour ozone standard. In conformance with 2010 EPA guidance, the District adopted Rule 3170 (Federally Mandated Ozone Nonattainment Fee)[10] to meet Section 185 requirements under the CAA. EPA approval of this Maintenance Plan would meet the findings necessary under the CAA to stop collection of Section 185 fees under Rule 3170.

Over the past decades, the District has implemented generations of emissions control measures for stationary and area sources under its jurisdiction. Similarly, the California Air Resources Board (CARB) has adopted regulations for mobile sources. Together, these efforts represent the nation's toughest air pollution emissions controls. In addition to having the toughest air regulations in the nation, the District also operates the most effective and efficient incentive grants program, investing over $5 billion in public/private funding towards clean air projects to date that have replaced thousands of vehicles and equipment with the cleanest technologies and achieved over 240,000 tons of emissions reductions. Due to the significant investments made by Valley businesses and residents, the Valley's ozone and PM2.5 precursor emissions are at historically low levels, and air quality has improved significantly, providing Valley residents with associated health benefits.

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Ozone Air Quality in the Valley

Despite the significant air quality progress in the Valley, many challenges remain as the District develops new attainment plans to meet increasingly stringent federal standards. The Valley's natural environment (including topography, meteorology, drought and wildfires) favors the formation and retention of ozone air pollution in the Valley. The Valley tends to experience the highest ozone concentrations from June to September, due to the increase in solar radiation and heat during this time of the year, both components of ozone formation, as well as the increased frequency of high pressure systems that create poor atmospheric dispersion conditions across the region. Emissions from wildfires, which often occur during the peak of the Valley's ozone season, can further impact public health and exacerbate the region's attainment challenges.

In addition to these challenges, the Valley is home to major transportation corridors for goods movement, resulting in significant emissions and air pollution impacts from freight activity. State and federal law limits the District's ability to regulate emissions from mobile sources, which represents the vast majority of air pollutant emissions in the region.

[10] SJVAPCD. Rule 3170 Federally Mandated Ozone Nonattainment Fee. Retrieved from: https://www.valleyair.org/rules/currntrules/3-Rule3170-0511.pdf

Despite these challenges, the innovative control measures and strategies adopted by the District and CARB have resulted in substantial emissions reductions and corresponding ozone concentration improvements. Over the last 30 years, the District has observed tremendous reductions in ozone concentrations throughout the Valley.

Required Elements for Redesignation

Section 107(d)(3)(E) of the Federal CAA states that a nonattainment area can be redesignated to attainment if the following conditions are met:

1. EPA has determined that the NAAQS has been attained.
2. EPA has fully approved the applicable implementation plan under Section 110(k) of the Federal CAA.
3. EPA has determined that the improvement in air quality is due to permanent and enforceable emission reductions.
4. The state has met all applicable requirements for the area under Section 110 and Part D.
5. EPA has fully approved a maintenance plan, including a contingency plan, for the area under Section 175(A) of the Federal CAA.

B. ATTAINMENT OF THE STANDARD

As previously stated, EPA published a final action in the Federal Register to determine that the Valley had attained the 1-hour ozone NAAQS through the District's clean data determination for the years 2012-2014. The District has continued to remain in attainment of the 1-hour ozone NAAQS in subsequent years, and is providing supplementary data for the years 2020-2022 to demonstrate continued attainment.

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B.1 CONTINUED ATTAINMENT OF THE 1-HOUR OZONE STANDARD (2020-2022)

Expected Number of Exceedances

To demonstrate continued attainment of the 1-hour ozone standard, the District calculated the expected exceedances at each site for 2020-2022. EPA has defined calculation procedures for calculating the expected number of exceedances in 40 CFR 50 Appendix H and in the 1979 document "*Guideline for the Interpretation of Ozone Air Quality Standards*."[11,12] The average number of exceedances for three consecutive years is based on summing the number of exceedances each year and dividing by three. If a site has an average of 1.0 or fewer expected exceedance days per year (i.e., a site averages three or fewer exceedance days over three years), then that site meets the federal 1-hour ozone standard. This calculation is simple when the air monitoring site has 365 valid measurements for the year, i.e., one measurement for each day. However, EPA recognizes that agencies do not collect 365 samples per year either due

[11] 40 CFR 50 Appendix H. Retrieved from: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-50/appendix-Appendix%20H%20to%20Part%2050
[12] EPA. Guideline for the Interpretation of Ozone Air Quality Standards. Retrieved from: https://archive.epa.gov/ttn/ozone/web/html/guide-o3.html

to less frequent sampling schedules or due to either routine maintenance, audits, occasional power outages, or other issues affecting data availability. EPA guidance thus clarifies the attainment test as:

$$\frac{\#\ of\ exceedances}{\#\ of\ valid\ sample\ days} * (\#\ of\ days\ in\ the\ year) = \#\ of\ expected\ exceedances$$

The result of this calculation must be equal to or less than 1.0 days per year when averaged over three consecutive years. Table 1 shows the average number of expected exceedance days per year, per monitoring site in the Valley. This data shows that all Valley sites continue to meet the 1-hour ozone NAAQS based on 2020-2022 data. The 1-hour ozone NAAQS is 0.12 ppm rounded to the closest one hundredth. Thus, 1-hour ozone concentrations at or greater than 0.125 ppm exceed the standard, and 1-hour ozone concentrations at or lower than 0.124 ppm meet the standard. If any hour in a day exceeds the standard, then that day is counted as one exceedance day. The highest hourly concentration on a given day is recorded as the 1-hour ozone concentration for that day (though all hourly concentrations are kept on record and analyzed as well). The EPA's Air Quality System (AQS) database serves as the official repository of ambient ozone data collected by the District's air monitoring network.[13] The expected number of exceedances are available on EPAs iADAM tool from 1973 through 2021.[14] The 2022 expected exceedances are not yet available in the iADAM tool and were thus calculated based on the above formula.

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[13] U.S. Environmental Protection Agency: Technology Transfer Network (TTN), Air Quality System (AQS): *AQS Web Application.* (2013). Retrieved from: http://www.epa.gov/ttn/airs/airsaqs/aqsweb/
[14] EPA Air Quality Data Statistics tool iADAM. Retrieved from: https://www.arb.ca.gov/adam

Table 1 Average Expected Exceedance Days and Attainment Test

Station ID	Station Name	Measured Exceedances			Expected Exceedances			Average Expected Exceedances	Pass Test?
		2020	2021	2022	2020	2021	2022		
Bakersfield MSA (SJVAPCD portion of Kern County only)									
0007	Edison	2	0	1	2.0	0.0	1.0	1.0	Yes
0008	Maricopa	0	0	0	0.0	0.0	0.0	0.0	Yes
0014	Bakersfield-California	0	0	0	0.0	0.0	0.0	0.0	Yes
0232	Oildale	0	0	0	0.0	0.0	0.0	0.0	Yes
2012	Bakersfield-Muni	--	0	0	--	0.0	0.0	0.0	Yes
5002	Arvin-Di Giorgio	1	0	0	1.8	0.0	0.0	0.6	Yes
6001	Shafter	0	0	0	0.0	0.0	0.0	0.0	Yes
Fresno MSA									
0007	Fresno-Drummond	0	1	0	0.0	1.0	0.0	0.3	Yes
0011	Fresno-Garland	0	0	0	0.0	0.0	0.0	0.0	Yes
0242	Fresno-Sierra Sky Park	0	0	0	0.0	0.0	0.0	0.0	Yes
2009	Tranquility	0	0	0	0.0	0.0	0.0	0.0	Yes
4001	Parlier	0	0	0	0.0	0.0	0.0	0.0	Yes
5001	Clovis	2	0	0	2.1	0.0	0.0	0.7	Yes
Hanford-Corcoran MSA									
1004	Hanford	0	0	0	0.0	0.0	0.0	0.0	Yes
Madera MSA									
0004	Madera-Pump	0	0	0	0.0	0.0	0.0	0.0	Yes
2010	Madera-City	0	0	0	0.0	0.0	0.0	0.0	Yes
Merced MSA									
0003	Merced-Coffee	0	0	0	0.0	0.0	0.0	0.0	Yes
Modesto MSA									
0005	Modesto	0	0	0	0.0	0.0	0.0	0.0	Yes
0006	Turlock	0	0	0	0.0	0.0	0.0	0.0	Yes
Stockton MSA									
1003	Stockton	0	0	1	0.0	0.0	1.0	0.3	Yes
3005	Tracy	0	0	0	0.0	0.0	0.0	0.0	Yes
Visalia-Porterville MSA									
2002	Visalia	1	0	0	1.0	0.0	0.0	0.3	Yes
2010	Porterville	0	0	0	0.0	0.0	0.0	0.0	Yes

*Includes data impacted by exceptional events, such as wildfires.

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Missing Data Analysis

The number of valid sample days must meet or exceed a completeness level established by EPA. The data completeness level for the 1-hour ozone standard is defined as collecting 75% of the hourly data between 9 AM and 9 PM during the ozone season. The Arvin-Di Giorgio site was non-operational from December 2019 to June 2020. The District is confident that this site did not exceed the 1-hour ozone standard during this time period because this site typically records its peak ozone concentrations in June through September each year and has only exceeded the 1-hour ozone standard one time (in August 2020) since the site was established in November 2009. The District's data capture rate exceeded the mandated levels for all other sites during 2020-2022.

Even when the data completeness requirements were met for the ozone monitors in the District's network, there were some data unavailability periods that caused some hours or days to be missed. EPA recognizes that it is highly unlikely for an ozone measurement to be available for every day, and that there are many situations which may cause for a missing-value to occur.[15] For example, an ozone analyzer could be taken offline for multiple days for extensive maintenance, typically performed when ozone levels are expected to be low. Additionally, the analyzer may malfunction, experience an extended power outage, or other events out of the District's control. To accommodate these situations, EPA allows the clean data determination documentation to include a meteorological analysis and/or a missing data analysis that shows that no exceedances would have occurred during time periods when air monitoring data is not available.[16] 43 CONT

The District examined sites with missing days in order to show that exceedances would not have occurred on days when insufficient data was collected. The ozone season for California is defined from January to December, but for practical purposes, the District's peak ozone readings are in the afternoon from May through October. When considering incomplete data, one scenario involves having an overall incomplete day while collecting enough afternoon data to either capture an exceedance or show that an exceedance did not happen on that day. Another likely possible scenario that must be considered is when data is not collected during the peak afternoon on a given day even though 75% of the data was collected during the hours between 9:00 AM and 9:00 PM. These scenarios were considered when completing the following missing data analysis. The District examined all ozone sites throughout the Valley for missing days to ensure that sites would have not exceeded the 1-hour ozone standard if the data was collected.

For 2020, various sites across multiple counties experienced outages during the May through October period. With the exception of Kings County, 2020 had at least one missing day in each county. Ozone levels remained low in each county and at individual sites on the day before and after the missing days. Due to the available data

[15] EPA. Guideline for the Interpretation of Ozone Air Quality Standards. Retrieved from: https://archive.epa.gov/ttn/ozone/web/html/guide-o3.html
[16] Section 2.2, Guideline for the Interpretation of Ozone Air Quality Standards (EPA, 1979). Retrieved from: https://archive.epa.gov/ttn/ozone/web/html/guide-o3.html

at other sites within each county being below the standard at the time of the outage, it can be concluded that the down sites were under the standard as well. All sites operated by CARB and the District met or exceeded the 75% requirement during this period.

Table 2 through Table 8 summarize missed measurements during peak ozone hours from May-October of 2020. The maximum value columns show the maximum value the day before and the day after the missing data period. The county maximum column shows the highest measured value in each corresponding county during the missing data periods, which in this case are considerably lower than the 1-hour ozone standard. Based on this, it is concluded that these sites would have reported values well below the standard if the analyzers were operating. Even with these missing days, the District collected a minimum of 86% of the required data which is far above the required 75%.

Table 2 2020 Missing Data Analysis for San Joaquin County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Tracy	May 22-27	49	57	56
Tracy	June 1-4	37	50	69

Table 3 2020 Missing Data Analysis for Stanislaus County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Turlock	May 22-26	54	69	71

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CONT

Table 4 2020 Missing Data Analysis for Merced County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Merced-Coffee	Aug. 30-31	76	65	N/A

Table 5 2020 Missing Data Analysis for Madera County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Madera-Pump	Oct. 12-19	40	78	89

Table 6 2020 Missing Data Analysis for Fresno County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Clovis	Oct. 8	75	47	57
Clovis	Oct. 12	43	64	62
Fresno-Garland	Aug.16-17	73	100	114
Tranquillity	Oct. 17-19	72	53	92
Parlier	July 9-10	73	78	86

Table 7 2020 Missing Data Analysis for Tulare County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Visalia	July 23-30	67	85	89
Visalia	Aug. 9-12	60	61	85
Porterville	Oct. 6-7	71	62	91

Table 8 2020 Missing Data Analysis for Kern County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Edison	July 12-14	91	79	92
Maricopa	Aug. 31-Sep. 1	79	90	97
Bakersfield-California	May 6-7	64	75	87
Bakersfield-California	Sep. 21-22	71	53	99
Bakersfield-Muni	May 2-19	66	53	98
Shafter	Sep. 25-26	57	68	81
Shafter	Oct. 26-28	43	63	62

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For 2021, various sites across multiple counties experienced outages during the May through October period. As ozone levels were low throughout each county and at each site on the day before and after the missing days, it is concluded that these days would not have exceeded the standard. Therefore, all sites operated by CARB and the District met or exceeded the 75% requirement during this period.

Table 9 through Table 13 summarize missed measurements during peak ozone hours from May-October. The maximum value columns show the maximum value the day before and the day after the missing data period. The county maximum column shows the highest measured value in each corresponding county during the missing data periods, which in this case are considerably lower than the 1-hour ozone standard. Based on this, it is concluded that these sites would have reported values well below the standard if the analyzers were operating. Even with these missing days, the District collected a minimum of 86% of the required data in every county within the District which is far above the required 75%.

Table 9 2021 Missing Data Analysis for Stanislaus County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Modesto	Oct. 11-15	54	67	65

Table 10 2021 Missing Data Analysis for Fresno County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Parlier	May 21-June 3	51	64	79

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CONT

Table 11 2021 Missing Data Analysis for Kings County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Hanford	May 5-7	59	58	58
Hanford	June 4-18	67	88	102

Table 12 2021 Missing Data Analysis for Tulare County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Porterville	June 2-3	101	80	85
Porterville	Sep. 19-20	80	49	54

Table 13 2021 Missing Data Analysis for Kern County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Maricopa	Sep. 26-27	63	46	66
Oildale	May 3-5	37	48	79
Oildale	Oct. 25-26	44	50	45

Likewise, during 2022, certain ozone analyzers in Stanislaus, Fresno, and Kern Counties did not operate for a few days during the peak ozone season. Table 14 through Table 16 summarize missed measurements during peak ozone hours from May-October. In every case, the county maximums during the outage are lower than the 1-hour ozone standard, and lower than either the day before or the day after. These sites would have measured values below the standard if the analyzers were operating. All sites operated in the Valley by CARB and the District met or exceeded the 75% requirement during this period.

Table 14 2022 Missing Data Analysis for Stanislaus County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Modesto	Oct. 21-Nov. 9	65	29	68

Table 15 2022 Missing Data Analysis for Fresno County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Tranquillity	Sep. 6-13	68	42	98

Table 16 2022 Missing Data Analysis for Kern County

Site	Date	Maximum Value Day Before Outage (ppb)	Maximum Value Day After Outage (ppb)	County Maximum During Outage (ppb)
Maricopa	June 20-21	51	63	91
Bakersfield-Muni	June 14-15	59	81	91
Arvin-Di Giorgio	Sep. 9-14	74	67	87
Arvin-Di Giorgio	Sep. 24-25	84	83	99

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In the few instances that there is missing data at peak locations in the Valley, the District has shown that the county maximum for those time periods were well under the 1-hour ozone standard. Additionally, the ozone concentrations measured for the days before and after the missing hours were well under the standard in all cases. Based on this, the District has continued to show attainment through the 2020-2022 period.

C. STATE IMPLEMENTATION PLAN (SIP) APPROVAL

On April 5, 2016, EPA approved a revision to the California state implementation plan (SIP) which consisted of the *2013 Ozone Plan*. EPA approved the following plan elements, with the exception of the attainment contingency provision:

- Reasonably available control measures (RACM) demonstration
- Rate-of-Progress (ROP) demonstration
- Attainment demonstration
- ROP contingency measures
- Provisions for clean fuels or advanced control technologies for boilers
- Vehicle miles traveled (VMT) emissions offset demonstrations

Thus, all applicable requirements have been approved under Section 110(k) for the purposes of redesignation in accordance with Section 107(d)(3)(E).

D. PERMANENT AND ENFORCEABLE IMPROVEMENT IN AIR QUALITY

EPA maintenance plan requirements note that, "the state must be able to reasonably attribute the improvement in air quality to emission reductions which are permanent and enforceable" (Calcagni Memo). EPA further notes that attainment resulting from temporary emission reductions (such as a shutdown or economic downturn) or from "unusually favorable meteorology", would not qualify as resulting from permanent and enforceable emission reductions. In the sections below, the District is providing supplemental information to demonstrate that emission reductions achieved for the Valley to meet the 1-hour ozone standard are permanent and enforceable.

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D.1 Enforceable Regulations Have Achieved Permanent Emission Reductions

To achieve the District's mission of improving air quality and public health for all Valley residents, the District has developed and implemented several air quality plans to reduce emissions from stationary sources. The control strategies outlined in existing District attainment plans include the adoption of nearly 650 of the most stringent rules in the nation, and strong voluntary incentive programs that have invested more than $5 billion of combined public and private funds in clean-air projects.

Table 17 shows the latest iteration of the adopted rules, including EPA approval dates. Similarly, CARB has adopted stringent regulations for area and mobile sources under their jurisdiction, which are summarized in Table 18. Together, these efforts represent the nation's toughest air pollution control program, and have resulted in a significant reduction in ozone precursor emissions (Figure 1). Emissions will continue to be reduced under the District's current and upcoming ozone and PM2.5 attainment planning efforts.

Table 17 Adopted District Regulations Achieving Permanent and Enforceable Emission Reductions

Adopted District Regulatory Control Measures	Date Last Adopted/ Amended	EPA Approval Date	FR citation
Rule 4103 Open Burning	06/17/2021	06/16/22	87 FR 36222-36224
Rule 4106 Prescribed Burning and Hazard Reduction Burning	06/21/01	02/27/02	67 FR 8894-8897
Rule 4306 Boilers, Steam Generators, and Process Heaters-Phase 3	12/17/20	*Pending Approval*	-
Rule 4307 Boilers, Steam Generators, and Process Heaters-2.0 MMBtu/hr to 5.0 MMBtu/hr	04/21/16	08/14/17	82 FR 37817-37819
Rule 4308 Boilers, Steam Generators, and Process Heaters-0.075 MMBtu/hr to less than 2.0 MMBtu/hr	11/14/13	2/12/15	80 FR 7803-7805
Rule 4309 Dryers, Dehydrators, and Ovens	12/15/05	05/30/07	72 FR 29886-29889
Rule 4311 Flares	12/17/20	12/28/22	87 FR 79806-79808
Rule 4320 Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater than 5.0 MMBtu/hr	12/17/20	*Pending Approval*	-
Rule 4352 Solid Fuel Fired Boilers, Steam Generators and Process Heaters	12/16/21	*Pending Approval*	-
Rule 4354 Glass Melting Furnaces	12/16/21	*Pending Approval*	-
Rule 4565 Biosolids, Animal Manure, and Poultry Litter Operations	03/15/07	01/17/12	77 FR 2228-2233
Rule 4566 Organic Material Composting Operations	08/18/11	11/29/12	77 FR 71129-71131
Rule 4570 Confined Animal Facilities	10/21/10	01/17/12	77 FR 2228-2233
Rule 4601 Architectural Coatings	04/16/20	12/22/22	87 FR 78544-78545
Rule 4603 Surface Coating of Metal Parts and Products, Plastic Parts and Products, and Pleasure Crafts	09/17/09	11/01/11	76 FR 67369-67370
Rule 4604 Can and Coil Coating Operations	09/20/07	01/19/10	75 FR 2796-2800
Rule 4605 Aerospace Assembly and Component Coating Operations	06/16/11	11/16/11	76 FR 70886-70887
Rule 4606 Wood Products and Flat Wood Paneling Products Coating Operations	10/16/08	10/15/09	74 FR 52894-52895
Rule 4607 Graphic Arts and Paper, Film, Foil, and Fabric Coatings	12/18/08	10/15/09	74 FR 52894-52895
Rule 4612 Motor Vehicle and Mobile Equipment Coating Operations	10/21/10	02/13/12	77 FR 7536-7537
Rule 4621 Gasoline Transfer into Stationary Storage Containers, Delivery Vessels, and Bulk Plants	12/19/13	02/10/15	80 FR 7345-7347
Rule 4622 Gasoline Transfer into Motor Vehicle Fuel Tanks	12/19/13	02/10/15	80 FR 7345-7347
Rule 4624 Transfer of Organic Liquid	12/20/07	10/15/09	74 FR 52894-52895
Rule 4653 Adhesives and Sealants	09/16/10	02/13/12	77 FR 7536-7537
Rule 4661 Organic Solvents	09/20/07	05/05/10	75 FR 24406-24408
Rule 4662 Organic Solvent Degreasing Operations	09/20/07	07/30/09	74 FR 37948-37949
Rule 4663 Organic Solvent Cleaning, Storage, and Disposal	09/20/07	07/30/09	74 FR 37948-37949

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Adopted District Regulatory Control Measures	Date Last Adopted/ Amended	EPA Approval Date	FR citation
Rule 4682 Polystyrene, Polyethylene, and Polypropylene Products Manufacturing	12/15/11	09/20/12	77 FR 58312-58313
Rule 4684 Polyester Resin Operations	08/18/11	02/06/12	77 FR 5709-5710
Rule 4692 Commercial Charbroiling	06/21/18	09/14/20	85 FR 56521-56525
Rule 4694 Wine Fermentation and Storage Tanks	12/15/05	11/29/12	77 FR 71109-71111
Rule 4695 Brandy Aging and Wine Aging Operations	09/17/09	08/04/11	76 FR 47076-47077
Rule 4702 Internal Combustion Engines	08/19/21	*Pending Approval*	-
Rule 4703 Stationary Gas Turbines	09/20/07	10/21/09	74 FR 53888-53889
Rule 4902 Residential Water Heaters	03/19/09	05/05/10	75 FR 24408-24409
Rule 4905 Natural Gas-Fired, Fan-Type Residential Central Furnaces	12/16/21	*Pending Approval*	-
Rule 9310 School Bus Fleets	09/21/06	03/08/10	75 FR 10420-10438
Rule 9410 Employer-Based Trip Reduction	12/17/09	02/09/16	81 FR 6761-6763
Rule 9510 Indirect Source Review (ISR)	12/21/17	06/25/21	86 FR 33542-33544
Rule 9610 State Implementation Plan Credit for Emission Reductions Generated Through Incentive Programs	06/20/13	04/09/15	80 FR 19020-19033

Table 18 Adopted CARB Regulatory Mobile Source Control Measures since 2008

Board Action	Hearing Date
Public Hearing to Consider Proposed In-Use Locomotive Regulation: The Board adopted the Proposed In-Use Locomotive Regulation, which aims to reduce emissions from locomotives operating in California. This is the second of two Board Meetings; the Board also adopted findings and a Statement of Overriding Considerations under the California Environmental Quality Act, and certifying the Final Environmental Impact Analysis.	4/27/23
Public Hearing to Consider Proposed Advanced Clean Fleets Regulation: The Board adopted the Advanced Clean Fleets Regulation, which aims to accelerate the widespread adoption of zero-emission vehicles in the medium- and heavy-duty sector and for light-duty package delivery vehicles. This is the second of two Board Meetings; the Board also adopted findings and a Statement of Overriding Considerations under the California Environmental Quality Act, and certifying the Final Environmental Impact Analysis.	4/27/23
Public Hearing to Consider Proposed Amendments to the Procedures for Exemption of Add-On and Modified Part(s) for On-Road Vehicles/Engines Specific to Electric Vehicle Conversions: The Board adopted amendments to the Aftermarket Parts Procedure to clarify the process for electric vehicle conversions to receive an exemption from the anti-tampering prohibitions of the California Vehicle Code section 27156.	3/23/23
Public Hearing to Consider Proposed Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation: The Board adopted the Proposed Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation which will reduce harmful emissions from off-road mobile vehicles.	11/17/22
Public Hearing to Consider Proposed Advanced Clean Cars II Regulation: The Board adopted the Advanced Clean Cars II Regulations. This is the second of two Board hearings on this item. The Board also certified the Final Environmental Analysis and approved the written response to comments received on the Draft Environmental Analysis. The regulations will be submitted to the United States Environmental Protection Agency for approval as a revision to the California state implementation plan required by the federal Clean Air Act.	8/25/22

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Board Action	Hearing Date
Public Hearing to Consider Proposed Amendments to the Commercial Harbor Craft Regulation: The Board adopted the Proposed Amendments to the Commercial Harbor Craft Regulation, which aims to further reduce emissions from harbor craft in California. This is the second of two Board hearings on this item; the Board certified the Final Environmental Analysis and approved the written response to comments on the Draft Environmental Analysis.	3/24/22
Public Hearing to Consider Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate: The Board adopted amendments to the TRU Airborne Toxic Control Measure. The amendments will achieve additional emission and health risk reductions by requiring zero-emission truck TRUs, a particulate matter (PM) emission standard for newly-manufactured non-truck TRU engines, and the use of lower global warming potential refrigerants. This is the second of two Board hearings on this item; the Board certified the Final Supplemental Environmental Analysis and approved the written response to comments on the Draft Supplemental Environmental Analysis.	2/24/22
Public Hearing to Consider Proposed Amendments to the Small Off-Road Engine Regulation: Transition to Zero Emissions: The Board adopted amended regulations and certification and test procedures for small off-road engines (SORE). The amendments are necessary to accelerate the transition of SORE to zero emissions to reduce emissions. Deployment of zero-emission equipment is key to meeting the expected emission reductions in the 2016 State Implementation Plan Strategy and the goals of California Executive Order N-79-20.	12/9/21
Public Hearing to Consider the Proposed Heavy-Duty Inspection and Maintenance Regulation: The Board adopted the Proposed Heavy-Duty Inspection and Maintenance Regulation. This new regulation requires owners of non-gasoline heavy-duty vehicles with gross vehicle weight ratings over 14,000 pounds to periodically demonstrate that their vehicles' emissions control systems are properly functioning in order to legally operate within the state. This regulation is designed to achieve criteria emissions reductions by ensuring that malfunctioning emissions control systems are timely repaired. This regulation would replace the California Air Resources Board's existing heavy-duty vehicle inspection programs.	12/9/21
Public Hearing to Consider Proposed Revisions to the On-Board Diagnostic System Requirements and Associated Enforcement Provisions for Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles and Engines, and Heavy-Duty Engines: The Board adopted amendments to the light-duty, medium-duty, and heavy-duty on-board diagnostic (OBD) system regulations to require more data to be stored by the OBD systems, address issues regarding several malfunction monitors, and address manufacturers' implementation concerns.	7/22/21
Public Hearing to Consider Proposed Clean Miles Standard: The Board adopted the Clean Miles Standard Regulation, which includes the annual electrification and greenhouse gas targets for transportation network companies (TNC). This regulation is in response to Senate Bill 1014 (Skinner, Stats. 2018, Ch. 369) adopted in 2018.	5/20/21
Public Hearing to Consider Proposed Amendments to the Antiperspirants and Deodorants Regulation; Consumer Products Regulation; Aerosol Coating Products Regulation; Alternative Control Plan Regulation; the Tables of Maximum Incremental Reactivity Values; and Test Method 310: The Board adopted amendments to the Consumer Products Program Regulations to help attain federal ozone standards by setting or strengthening volatile organic compound standards for certain product categories. The amendments will reduce public exposure to air toxics emissions and provide other clarifications within the program to improve transparency, clarity, and effectiveness.	3/25/21
Public Hearing to Consider Proposed Amendments to the Enhanced Vapor Recovery Regulations: The Board adopted amendments to certification and test procedures for vapor recovery systems at gasoline dispensing facilities. These amendments are necessary to improve cost-effectiveness, preserve emission reductions, and clarify the procedures for better regulatory certainty and enforceability.	12/10/20
Public Hearing to Consider Proposed Control Measure for Ocean-Going Vessels At Berth: The Board adopted the Control Measure for Ocean-Going Vessels At Berth (Control Measure). The Board certified the Environmental Analysis prepared for the Control Measure. The Control Measure will supersede the existing At-Berth Regulation, as specified, and is designed to achieve further reductions in emissions from vessels at berth to reduce adverse health impacts to communities surrounding ports and terminals throughout California. Emission reductions will be achieved through the inclusion of new vessel categories (such as vehicle carriers and tanker vessels), new ports, and independent marine terminals. This is the third hearing of three for this item.	8/27/20

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Board Action	Hearing Date
Public Hearing to Consider Proposed Heavy-Duty Engine and Vehicle Omnibus Regulation and Associated Amendments: The Board adopted amendments to the exhaust emission standards and test procedures for 2024 and subsequent model year heavy-duty engines, the heavy-duty in-use testing program, the emissions warranty and useful life period requirements, the heavy-duty durability demonstration program, the emissions warranty information and reporting requirements and corrective action procedures, the heavy-duty on-board diagnostic system requirements, the Phase 2 greenhouse gas regulation, and other requirements.	8/27/20
Public Hearing to Consider Proposed Procedures for the Exemption of Add-On and Modified Part(s) for On-Road Vehicles/Engines: The Board adopted the Procedures for the Exemption of Add-On and Modified Part(s) for On-Road Vehicles/Engines. The updated aftermarket part procedures incorporate language reflecting current vehicle and engine emissions related technologies and standards. It also clarifies the requirements to improve review, testing, and approval timing to get products to market sooner.	7/23/20
Public Hearing to Consider the Proposed Advanced Clean Trucks Regulation: The Board adopted requirements for truck manufacturers to sell zero-emission trucks in California and a one time requirement for large entities to report about their facilities, types of truck services used, and fleet of vehicles. This is the second of two Board hearings on this item; the Board certified the Final Environmental Analysis, approved the written response to comments received on the Draft Environmental Analysis, and adopted the Advanced Clean Trucks Regulation for submission to the United States Environmental Protection Agency as a revision to the California State Implementation Plan.	6/25/20
Public Hearing to Consider the Proposed Amendments to the Regulation on the Commercialization of Alternative Diesel Fuels: The Board adopted amendments to the Regulation on the Commercialization of Alternative Diesel Fuels (ADF). Staff proposed to amend the ADF Regulation to reinforce the emissions certification testing requirements and require biodiesel additives and ADF formulations to be certified according to new certification procedures. The amendments reinforce the originally intended efficacy of additives or alternative diesel formulations certified to mitigate potential oxides of nitrogen (NO_x) emissions increases from the use of biodiesel. The Board also adopted an addendum to a previously certified Environmental Analysis in compliance with the California Environmental Quality Act.	4/23/20
Public Meeting to Consider San Joaquin Valley Agricultural Equipment Incentive Measure: The Board adopted the San Joaquin Valley Agricultural Equipment Incentive Measure for submission to the United States Environmental Protection Agency as a revision to the California State Implementation Plan (SIP). The measure achieves SIP creditable emission reductions from agricultural equipment incentive projects.	12/12/19
Public Hearing to Consider Proposed Amendments to the Low Carbon Fuel Standard: The Board adopted amendments to the Low Carbon Fuel Standard (LCFS) Regulation, focusing on strengthening the program's cost containment provisions and ensuring that LCFS residential charging credit revenue value benefits disadvantaged and low-income communities.	11/21/19
Public Hearing to Consider Proposed Amendments to Certification Procedures for Vapor Recovery Systems for Aboveground Storage Tanks at Gasoline Dispensing Facilities: The Board adopted amendments to Phase II Enhanced Vapor Recovery (EVR) requirements for existing aboveground storage tanks (AST) at gasoline dispensing facilities (GDF). The amendments clarify definitions and improve cost effectiveness of the Phase II EVR equipment upgrade requirements based on annual gasoline throughput at AST GDFs. The Board adopted the environmental analysis set forth in the Initial Statement of Reasons.	7/25/19
Public Hearing to Consider the Proposed Zero-Emission Airport Shuttle Regulation: The Board adopted the Zero-Emission Airport Shuttle Regulation. The regulation will transition combustion powered airport shuttles to zero-emission vehicles and will apply to private and public fixed destination shuttles that serve California's commercial airports. The Board certified the Final Environmental Analysis, approving the written response to any environmental comments received, approving findings and statement of overriding considerations, and adopting the regulation at this meeting.	6/27/19
Public Hearing to Consider Proposed Alternative Certification Requirements and Test Procedures for Heavy-Duty Electric and Fuel-Cell Vehicles and Proposed Standards and Test Procedures for Zero-Emission Powertrains (Zero-Emission Powertrain Certification Regulation): The Board adopted the Zero-Emission Powertrain Certification Regulation, which establishes a new optional certification pathway for heavy-duty electric and fuel-cell vehicles and the zero-emission powertrains they use. The amendments provided additional market transparency and help ensure effective in-use support for such vehicles and powertrains. This is the second of two Board hearings on this item; the Board certified the Final Environmental Analysis, approved written response to any environmental comments received, and approved findings and statement of overriding considerations.	6/27/19

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Board Action	Hearing Date
Public Hearing to Consider Proposed Amendments to the Regulation for the Certification of Vapor Recovery Systems for Cargo Tanks: The Board adopted amendments to the Certification of Vapor Recovery Systems on Cargo Tanks Regulation that establish a regulatory mechanism to periodically evaluate program costs and subsequently adjust the certification fee to recover these costs, per the authority under the Health and Safety Code section 41962. In addition, the amendments will establish: (1) a requirement for a public meeting prior to adjusting fees, (2) an effective date of January 1 following a fee revision, (3) the cost of replacement decals, and (4) procedures to request a certification fee refund.	4/25/19
Public Hearing to Consider Proposed Amendments to the Red Sticker Program for Off-Highway Recreational Vehicles: The Board adopted amendments to the Red Sticker Program for Off-Highway Recreation Vehicles (OHRV). OHRV are primarily used in public State parks and federally designated lands, as well as on private tracks. The goal of the amendments is to end the current red sticker program which allows for CARB certification of OHRV that do not meet emissions standards. The amendments include provisions that end the certification of new red sticker vehicles, end riding restrictions on public lands for existing red sticker vehicles, establish new OHRV emissions standards, and increase incentives for fleet emissions averaging and zero emission OHRV. The amendments are intended to cause emissions reductions from OHRV in California while ensuring availability for California dealers and riders.	4/25/19
Public Hearing to Consider the Proposed Amendments to the On-Road Heavy-Duty Diesel-Fueled Residential and Commercial Solid Waste Collection Vehicles Regulation to Include Heavy Cranes: The Board adopted amendments to the On-Road Heavy-Duty Diesel-Fueled Residential and Commercial Solid Waste Collection Vehicles (SWCV) regulation. The amendments include two distinct changes to the regulation, (1) to ensure that compliant SWCVs do not experience registration delays at the California Department of Motor Vehicles due to recent changes in California law; (2) to provide a more cost-effective compliance option for specialized heavy cranes.	1/24/19
Public Hearing to Consider the Proposed Innovative Clean Transit Regulation, a Replacement of the Fleet Rule for Transit Agencies: The Board adopted the Innovative Clean Transit (ICT) Regulation that requires California transit agencies to gradually transition their buses to zero-emission technologies. The ICT regulation is structured to allow transit agencies to take advantage of incentive programs by acting early and in a manner to implement plans that are best suited for their own situations. This is the second of two Board hearings on this item; the Board certified the Final Environmental Analysis, approving the written response to comments received on the Draft Environmental Analysis, and adopting the amendments at this meeting.	12/14/18
Public Hearing to Consider Proposed Revisions to On Board Diagnostic System Requirements, Including the Introduction of Real Emissions Assessment Logging, for Heavy Duty Engines, Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engine: The Board adopted amendments to the heavy-duty (HD) On Board Diagnostic (OBD) and medium-duty OBD II requirements to update the monitoring requirements for gasoline and diesel vehicles, to require more data parameters to be tracked and reported by the engine/vehicle, and to clarify and improve the regulation where necessary. Staff also update the associated HD OBD enforcement regulation to align with the changes to the HD OBD regulation and to modify the manufacturer self-testing requirements.	11/15/18
Public Hearing to Consider Proposed California Certification Procedures for Light-Duty Engine Packages for Use in New Light-Duty Specially-Produced Motor Vehicles for 2019 and Subsequent Model Years: The Board adopted the California Regulation and Certification Procedures for Light-Duty Engine Packages for Use In New Light-Duty Specially-Produced Motor Vehicles for 2019 And Subsequent Model Years. Staff presented regulations and certification procedures for manufacturers of light-duty engine packages for use in new light-duty specially constructed vehicles which resemble heritage vehicles originally produced at least 25 years ago	10/25/18
Public Meeting to Consider Proposed Amendments to California Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks: The Board adopted amendments to Vehicle Fill Pipe Specifications to help ensure new motor vehicle fill pipes are compatible and form a good seal with Phase II recovery nozzles that are certified for use at California gasoline stations as a means to reduce overpressure.	10/25/18
Public Hearing to Consider Proposed Amendments to Enhanced Vapor Recovery Regulations to Standardize Gas Station Nozzle Spout Dimensions to Help Address Storage Tank Overpressure: The Board adopted amendments to Enhanced Vapor Recovery Regulations to standardize gas station nozzle spout dimensions to improve compatibility with newer motor vehicle fill pipes. This compatibility is necessary to reduce air ingestion at the nozzle, which will help reduce storage tank overpressure conditions.	10/25/18

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Board Action	Hearing Date
Public Meeting to Consider the Proposed Submission of California's Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities into the California State Implementation Plan: The Board adopted a resolution directing staff to submit California's Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities into the California State Implementation Plan (Oil and Gas SIP Submittal). California Air Resources Board submitted the Oil and Gas SIP Submittal to the United States Environmental Protection Agency as a revision to the California State Implementation Plan.	10/25/18
Public Hearing to Consider Proposed Amendments to the Low-Emission Vehicle III Greenhouse Gas Emission Regulation: The Board adopted amendments to the Low-Emission Vehicle III greenhouse gas emission regulation to clarify that the "deemed to comply" option for model years 2021 through 2025 is applicable only if the currently adopted federal regulations remain in effect.	9/27/18
Public Hearing to Consider Proposed Amendments to the Low Carbon Fuel Standard Regulation and to the Regulation on Commercialization of Alternative Diesel Fuels: The Board adopted amendments designed to strengthen the Low Carbon Fuel Standard (LCFS) regulation through 2030 in line with the Senate Bill 32 greenhouse gas reduction goals. The amendments would enhance LCFS credit for zero-emission vehicle fueling infrastructure per Governor Brown's Executive Order B-48-18, adopt a protocol to enable credit generation for carbon capture and sequestration projects, expand fuel types and vehicle applications to which the LCFS regulation applies (including adding alternative jet fuel), improve crediting for innovative actions at petroleum refineries, and establish an independent third-party verification and verifier accreditation system to ensure accuracy of LCFS reported data. The amendments also include a number of technical changes to improve, simplify, streamline, and clarify the regulation. As part of this rulemaking, the Board will comply with a California court order by considering supplemental environmental analysis related to oxides of nitrogen (NOx) emissions from biodiesel, and amendments to the Alternative Diesel Fuels regulation based on that analysis. This is the first of two Board hearings on this item; the Board will not vote on the amendments at this meeting.	9/27/18
Public Hearing to Consider Proposed Amendments to California Emission Control System Warranty Regulations and Maintenance Provisions for 2022 and Subsequent Model Year On-Road Heavy-Duty Diesel Vehicles with Gross Vehicle Weight Rating Greater Than 14,000 Pounds and Heavy-Duty Diesel Engines in Such Vehicles: The Board adopted amendments to the California warranty and maintenance provisions for on-road heavy-duty (HD) diesel vehicles, and the engines used in such vehicles. Currently, because the warranty mileage period is disproportionate to the actual service lives of many modern HD vehicles and engines, vehicle owners have no incentive to pay for repairs of emissions-related problems that do not adversely affect fuel economy or performance, which results in additional emissions. Accordingly, staff presented to lengthen both the existing warranty periods and minimum maintenance intervals so as to reduce emissions by incentivizing vehicle owners to perform required maintenance and to seek more timely repairs, and to encourage manufacturers to design and produce more durable parts. Staff also clarified that the warranty coverage extends to any part that causes the illumination of the HD on-board diagnostic system malfunction indicator light.	6/28/18
Public Meeting to Consider Submission of the 2013 Amendments to the Cargo Tank Vapor Recovery Regulation into the California State Implementation Plan: The Board adopted a resolution directing staff to submit the 2013 Amendments to the Cargo Tank Vapor Recovery Regulations into the California State Implementation Plan (Cargo Tank SIP Submittal). CARB submitted the Cargo Tank SIP Submittal to the United States Environmental Protection Agency as a revision to the California State Implementation Plan.	6/28/18
Public Hearing to Consider Proposed Amendments to the Heavy-Duty Vehicle Inspection Program and Periodic Smoke Inspection Program: The amendments lower the allowable opacity limit for HD vehicles operating in California for both the HDVIP and PSIP, establish reporting requirements for the PSIP and smoke tester training requirements, and allow 2013 model year and newer engines to report on-board diagnostic data in lieu of performing the annual PSIP smoke test.	5/25/18
Public Hearing to Consider Proposed Amendments to the Consumer Products Regulation and Method 310: The adopted amendments to the consumer products regulation established an alternate compliance option for multi-purpose lubricant (MPL) products.	5/25/18
Public Hearing to Consider Proposed California Greenhouse Gas Emissions Standards for Medium- and Heavy-Duty Engines and Vehicles, and Proposed Amendments to the Tractor-Trailer Greenhouse Gas Regulation: The adoption creates new, more stringent California Phase 2 GHG emission standards that largely harmonize with the federal Phase 2 standards, and amendments to the Tractor-Trailer GHG regulation to harmonize California's Tractor-Trailer GHG regulation with the Phase 2 trailer standards. The California Phase 2 GHG standards are needed to meet the mandates of both AB 32 and of SB 32, and the California HSC.	2/8/18

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Board Action	Hearing Date
Public Hearing to Consider Proposed Amendments to the Airborne Toxic Control Measure For Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater – and to the Statewide Portable Equipment Registration Program Regulation: The proposed amendments will provide more time for cleaner engine replacement while preserving the expected emission reductions, and make other improvements to the ATCM. PERP will have corresponding amendments and make other improvements to the program.	11/16/17
Public Hearing to Consider the Proposed Amendments to California's Evaluation Procedures for New Aftermarket Catalytic Converters: The proposed amendments are for procedures used to evaluate and approve aftermarket catalytic converters designed for use on California passenger cars and trucks to allow them to be used for Low Emission Vehicle III emission standards.	9/28/17
Public Meeting to Consider the Proposed Amendments to the Evaporative Emission Requirements for Small Off-Road Engines: The proposed amendments will address to non-compliance of small off-road engines (SORE) with existing evaporative emission standards, as well as amendments to streamline the certification process by harmonizing where feasible with federal requirements.	11/17/16
Notice of Public Hearing to Consider Proposed Regulation to Provide Certification Flexibility for Innovative Heavy-Duty Engine and California Certification and Installation Procedures for Medium and Heavy-Duty Vehicle Hybrid Conversion Systems: This proposed regulation's certification flexibility is tailored to encourage development and market launch of heavy-duty engines meeting California's optional low oxides of oxides of nitrogen emission standards, robust heavy-duty hybrid engines, and high-efficiency heavy-duty engines.	10/20/16
Public Hearing to Consider Proposed Amendments to the Large Spark-Ignition Engine Fleet Requirements Regulation: The proposed amendment will establish new reporting and labeling requirements and extend existing recordkeeping requirements. The proposed regulatory amendments are expected to improve the reliability of the emission reductions projected for the existing LSI Fleet Regulation by increasing enforcement effectiveness and compliance rates.	7/21/16
Public Hearing to Consider Proposed Evaluation Procedure for New Aftermarket Diesel Particulate Filters Intended as Modified Parts for 2007 through 2009 Model Year On-Road Heavy-Duty Diesel Engines: The proposed amendment would establish a path for exempting aftermarket modified part DPFs intended for 2007 through 2009 on-road heavy-duty diesel engines from the prohibitions of the current vehicle code. Staff is also proposing to incorporate a new procedure for the evaluation of such DPFs.	4/22/16
Amendments to the Portable Fuel Container Regulation Amendments to the Portable Fuel Container (PFC) regulation, which include requiring certification fuel to contain 10 percent ethanol, harmonizing aspects of the Board's PFC certification and test procedures with those of the U.S. EPA, revising the ARB's certification process, and streamlining, clarifying, and increasing the robustness of ARB's certification and test procedures.	2/18/16
Technical Status and Proposed Revisions to On-Board Diagnostic System Requirements and Associated Enforcement Provisions for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines (OBD II) Amendments to the OBD II regulations that update requirements to account for LEV III applications and monitoring requirements for gasoline and diesel vehicles, and clarify and improve the regulation; also, updates to the associated OBD II enforcement regulation to align it with the proposed amendments to the OBD II regulations and a minor amendment to the definition of "emissions-related part" in title 13, CCR section 1900.	9/25/15
2015 Low Carbon Fuel Standard (LCFS) Amendments (2 of 2) Re-adoption of the Low Carbon Fuel Standard, which includes updates and revisions to the regulation now in effect. The proposed regulation was first presented to the Board at its February 2015 public hearing, at which the Board directed staff to make modifications to the proposal.	9/24/15
Proposed Regulation on the Commercialization of Alternative Diesel Fuels (2 of 2) Regulation governing the introduction of alternative diesel fuels into the California commercial market, including special provisions for biodiesel.	9/24/15
Intermediate Volume Manufacturer Amendments to the Zero Emission Vehicle Regulation (2 of 2) Amendments regarding intermediate volume manufacturer compliance obligations under the Zero Emission Vehicle regulation.	5/21/15

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Board Action	Hearing Date
2015 Amendments to Certification Procedures for Vapor Recovery Systems at Gasoline Dispensing Facilities—Aboveground Storage Tanks and Enhanced Conventional Nozzles Amendments would establish new performance standards and specifications for nozzles used at fleet facilities that exclusively refuel vehicles equipped with onboard vapor recovery systems, would provide regulatory relief for owners of certain existing aboveground storage tanks, and would ensure that mass-produced vapor recovery equipment matches the specifications of equipment evaluated during the ARB certification process.	4/23/15
Proposed Regulation for the Commercialization of Alternative Diesel Fuels (1 of 2) Regulation governing the introduction of alternative diesel fuels into the California commercial market, including special provisions for biodiesel. This is the first of two hearings on the item, and the Board will not take action to approve the proposed regulation.	2/19/15
Evaporative Emission Control Requirements for Spark-Ignition Marine Watercraft Regulation for controlling evaporative emissions from spark-ignition marine watercraft. The proposed regulation will harmonize, to the extent feasible, with similar federal requirements, while adding specific provisions needed to support California's air quality needs.	2/19/15
2015 Low Carbon Fuel Standard (LCFS) Amendments (1 of 2) Regulation for a Low Carbon Fuel Standard that includes re- adoption of the existing Low Carbon Fuel Standard with updates and revisions. This is the first of two hearings on the item, and the Board will not take action to approve the proposed regulation.	2/19/15
2014 Amendments to ZEV Regulation Additional compliance flexibility to ZEV manufacturers working to bring advanced technologies to market.	10/23/14
LEV III Criteria Pollutant Requirements for Light- and Medium-Duty Vehicles the Hybrid Electric Vehicle Test Procedures, and the HD Otto-Cycle and HD Diesel Test Procedures Applies to the 2017 and subsequent model years.	10/23/14
Low Carbon Fuel Standard 2014 Update As a result of a California Court of Appeal decision, ARB will revisit the LCFS rulemaking process to meet certain procedural requirements of the APA and CEQA. Following incorporation of any modifications to the regulation, the Board will consider the proposed regulation for adoption at a second hearing held in the spring of 2015.	7/24/14
Truck and Bus Rule Update Amendments to the Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen, and Other Criteria Pollutants From In-Use On-Road Diesel-Fueled Vehicles: increasing low-use vehicle thresholds, allowing owners to newly opt-in to existing flexibility provisions, adjusting "NOx exempt" vehicle provisions, and granting additional time for fleets in certain areas to meet PM filter requirements.	4/24/14
Heavy-Duty GHG Phase I: On-Road Heavy-Duty GHG Emissions Rule, Tractor-Trailer Rule, Commercial Motor Vehicle Idling Rule, Optional Reduced Emission Standards, Heavy-Duty Hybrid-Electric Vehicles Certification Procedure New GHG standards for MD and HD engines and vehicles identical to those adopted by the USEPA in 2011 for MYs 2014-18.	12/12/13
Zero emission vehicle test procedures Existing certification test procedures for plug-in hybrid vehicles need to be updated to reflect technology developments. The ZEV regulation will require minor modifications to address clarity and implementation issues.	10/24/13
Vapor Recovery for Gasoline Dispensing Facilities Amendments to certification and test procedures for vapor recovery equipment used on cargo tanks and at gasoline dispensing facilities.	7/25/13
Off-highway recreational vehicle evaporative emission control Staff proposes to set evaporative emission standards to control hydrocarbon emissions from Off-Highway Recreational Vehicles. The running loss, hot soak, and diurnal performance standards can be met by using proven automobile type control technology.	7/25/13

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Board Action	Hearing Date
LEV III and ZEV Programs for Federal Compliance Option Adopted amendments to deem compliance with national GHG new vehicle standards in 2017-2025 as compliance with California GHG standards for the same model years.	11/15/12 12/6/12 EO
Amendments to Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines Approved amendments to the verification procedure used to evaluate diesel retrofits through emissions, durability, and field testing. Amendments will lower costs associated with required in-use compliance testing, streamline the in-use compliance process, and will extend time allowed to complete verifications.	8/23/2012 EO 07/02/13
Amendments to On-Board Diagnostics (OBD I and II) Regulations Approved amendments to the light- and medium-duty vehicle and heavy-duty engine OBD regulations.	8/23/2012 EO 06/26/13
Advanced Clean Cars (ACC) Regulation: Low-Emission Vehicles and GHG Adopted more stringent criteria emission standards for MY 2015-2025 light and medium duty vehicles (LEV III), amended GHG emission standards for model year 2017-2025 light and medium duty vehicles (LEV GHG), amended ZEV Regulation to ensure the successful market penetration of ZEVs in commercial volumes, amended hydrogen fueling infrastructure mandate of the Clean Fuels Outlet regulation, and amended cert fuel for light duty vehicles from an MTBE-containing fuel to an E10 certification fuel.	1/26/12
Zero Emission Vehicle (ZEV) Adopted amendments to increase compliance flexibility, add two new vehicle categories for use in creating credits, increase credits for 300 mile FCVs, increase requirements for ZEVs and TZEVs, eliminate credit for PZEVs and AT PZEVs, expand applicability to smaller manufacturers, base ZEV credits on range, and make other minor changes in credit requirements	1/26/12
Amendments to Low Carbon Fuel Standard Regulation The amendments address several aspects of the regulation, including: reporting requirements, credit trading, regulated parties, opt-in and opt-out provisions, definitions, and other clarifying language.	12/16/11 10/10/12 EO
Amendments to Small Off-Road Engine and Tier 4 Off-Road Compression-Ignition Engine Regulations And Test Procedures; also "Recreational Marine" Spark-Ignition Marine Engine Amendments (Recreational Boats) adopted. Aligns California test procedures with U.S. EPA test procedures and requires off-road CI engine manufacturers to conduct in-use testing of their entire product lines to confirm compliance with previously established Not-To-Exceed emission thresholds.	12/16/2011 10/25/12 EO
Regulations and Certification Procedures for Engine Packages used in Light-Duty Specially Constructed Vehicles (Kit Cars) Ensures that certified engine packages, when placed into any Kit Car, would meet new vehicle emission standards, and be able to meet Smog Check requirements.	11/17/11 9/21/12 EO
Amendments to the California Reformulated Gasoline Regulations Corrects drafting errors in the predictive model, deletes outdated regulatory provisions, updates the notification requirements, and changes the restrictions on blending CARBOB with other liquids.	10/21/11 8/24/12 EO
Amendments to the In-Use Diesel Transport Refrigeration Units (TRU) ATCM Mechanisms to improve compliance rates and enforceability.	10/21/11 8/31/12 EO
Amendments to the Regulation for Cargo Handling Equipment (CHE) at Ports and Intermodal Rail Yards (Port Yard Trucks Regulation) Provides additional compliance flexibility, and maintains anticipated emissions reductions. As applicable to yard trucks and two-engine sweepers.	9/22/11 8/2/12 EO
Amendments to the Enhanced Vapor Recovery Regulation for Gasoline Dispensing Facilities New requirement for low permeation hoses at gasoline dispensing facilities.	9/22/11 7/26/12 EO
Amendments to Cleaner Main Ship Engines and Fuel for Ocean-Going Vessels Adjusts the offshore regulatory boundary. Aligns very low sulfur fuel implementation deadlines with new federal requirements.	6/23/11 9/13/12 EO
Particulate Matter Emissions Measurement Allowance For Heavy-Duty Diesel In-Use Compliance Regulation Emission measurement allowances provide for variability associated with the field testing required in the regulation.	6/23/11

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Board Action	Hearing Date
Amendments to Cleaner In-Use Heavy-Duty On-Road Diesel Trucks and LSI Fleets Regulations Amends five regulations to provide relief to fleets adversely affected by the economy, and take into account the fact that emissions are lower than previously predicted.	12/16/10 9/19/11 EO
Amendments to Cleaner In-Use Off-Road Diesel-Fueled Fleets Regulation Amendments provide relief to fleets adversely affected by the economy, and take into account the fact that emissions are lower than previously predicted.	12/16/10 10/28/11 EO
In-Use On-Road Diesel-Fueled Heavy-Duty Drayage Trucks at Ports and Rail Yard Facilities Amendments add flexibility to fleets' compliance schedules, mitigate the use of noncompliant trucks outside port and rail properties, and provide transition to the Truck and Bus regulation.	12/16/10 9/19/11 EO
Amendment of the ATCM for Diesel Transportation Refrigeration Units (TRU) Amendments expand the compliance options and clarify the operational life of various types of TRUs.	11/18/10 2/2/11 EO
Amendments to the ATCM for Stationary Compression Ignition Engines Approved amendments to closely align the emission limits for new emergency standby engines in the ATCM with the emission standards required by the federal Standards of Performance.	10/21/10 3/25/11 EO
Diesel Vehicle Periodic Smoke Inspection Program Adopted amendments to exempt medium duty diesel vehicles from smoke inspection requirements if complying with Smog Check requirements.	10/21/10 8/23/11 EO
Amendments to Commercial Harbor Craft Regulation Approved amendments to require the use of cleaner engines in diesel-fueled crew and supply, barge, and dredge vessels.	6/24/10 4/11/11 EO
Accelerated Introduction of Cleaner Line-Haul Locomotives Agreement with railroads sets prescribed reductions in diesel risk and target years through 2020 at four major railyards.	6/24/10
Amendments to the Statewide Portable Equipment Registration Regulation and Portable Engine ATCM Approved amendments that extend the deadline for removal of certain uncertified portable engines for one year.	1/28/10 8/27/10 EO 12/8/10 EO
Diesel Engine Retrofit Control Verification, Warranty, and Compliance Regulation Amendments Approved amendments to require per-installation compatibility assessment, performance data collection, and reporting of additional information, and enhance enforceability.	1/28/10 12/6/10 EO
Passenger Motor Vehicle Greenhouse Gas Limits Amendments Approved amendments granting credits to manufacturers for compliant vehicles sold in other states that have adopted California regulations.	9/24/09 2/22/10 EO
Amendments to In-Use Off-Road Diesel-Fueled Fleets Regulation Approved amendments to implement legislatively directed changes and provide additional incentives for early action.	7/23/09 12/2/09 EO 6/3/10 EO
Amendments to Heavy-Duty On-Board Diagnostics Regulations Approved amendments to the light and medium-duty vehicle and heavy duty engine OBD regulations.	5/28/2009 4/6/10 EO
Smog Check Improvements BAR adopted amendments to implement changes in state law and SIP commitments adopted by ARB between 1996 and 2007.	5/7/09 by BAR 6/9/09 EO
Pesticide Element Reduce volatile organic compound (VOC) emissions from the application of agricultural field fumigants in the South Coast, Southeast Desert, Ventura County, San Joaquin Valley, and Sacramento Metro federal ozone nonattainment areas.	4/20/09 10/12/09 EO (2) 8/2/11 EO
Low Carbon Fuel Standard Approved new standards to lower the carbon content of fuels.	4/20/09 11/25/09 EO
Pesticide Element for San Joaquin Valley DPR Director approved pesticide ROG emission limit of 18.1 tpd and committed to implement restrictions on non-fumigant pesticide use by 2014 in the San Joaquin Valley.	4/7/09 DPR
Tire Pressure Inflation Regulation Approved a regulation requiring automotive service providers to perform tire pressure checks as part of every service.	3/26/09 2/4/10 EO

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CONT

Board Action	Hearing Date
In-Use Off-Road Diesel-Fueled Fleets Amendments Makes administrative changes to recognize delays in the supply of retrofit control devices.	1/22/09
Aftermarket Critical Emission Parts on Highway Motorcycles Allows for the sale of certified critical emission parts by aftermarket manufacturers.	1/22/09 6/19/09 EO
Cleaner In-Use Heavy-Duty Diesel Trucks (Truck and Bus Regulation) Approved a regulation to reduce diesel particulate matter and oxides of nitrogen through fleet modernization and exhaust retrofits. Makes enforceability changes to public fleet, off-road equipment, and portable equipment regulations.	12/11/08 10/19/09 EO 10/23/09 EO
Large Spark-Ignition Engine Amendments Approved amendments to reduce evaporative, permeation, and exhaust emissions from large spark-ignition (LSI) engines equal to or below 1 liter in displacement.	11/1/08 3/12/09 EO
Small Off-Road Engine (SORE) Amendments Approved amendments to address the excessive accumulation of emission credits.	11/21/08 2/24/10 EO
Portable Outboard Marine Tanks and Components (part of Additional Evaporative Emission Standards) Approved a regulation that establishes permeation and emission standards for new portable outboard marine tanks and components.	9/25/08 7/20/09 EO
Cleaner Fuel in Ocean Going Vessels Approved a regulation that requires use of low sulfur fuel in ocean-going ship main engines, and auxiliary engines and boilers.	7/24/08 4/16/09 EO
Spark-Ignition Marine Engine and Boat Amendments Provides optional compliance path for > 500 hp sterndrive/inboard marine engines.	7/24/08 6/5/09 EO
Zero emission vehicles Updated California's ZEV requirements to provide greater flexibility with respect to fuels, technologies, and simplifying compliance pathways. Amendments give manufacturers increased flexibility to comply with ZEV requirements by giving credit to plug-in hybrid electric vehicles and establishing additional ZEV categories in recognition of new developments in fuel cell vehicles and battery electric vehicles.	3/27/08 12/17/08 EO

**Table provided by the California Air Resources Board*

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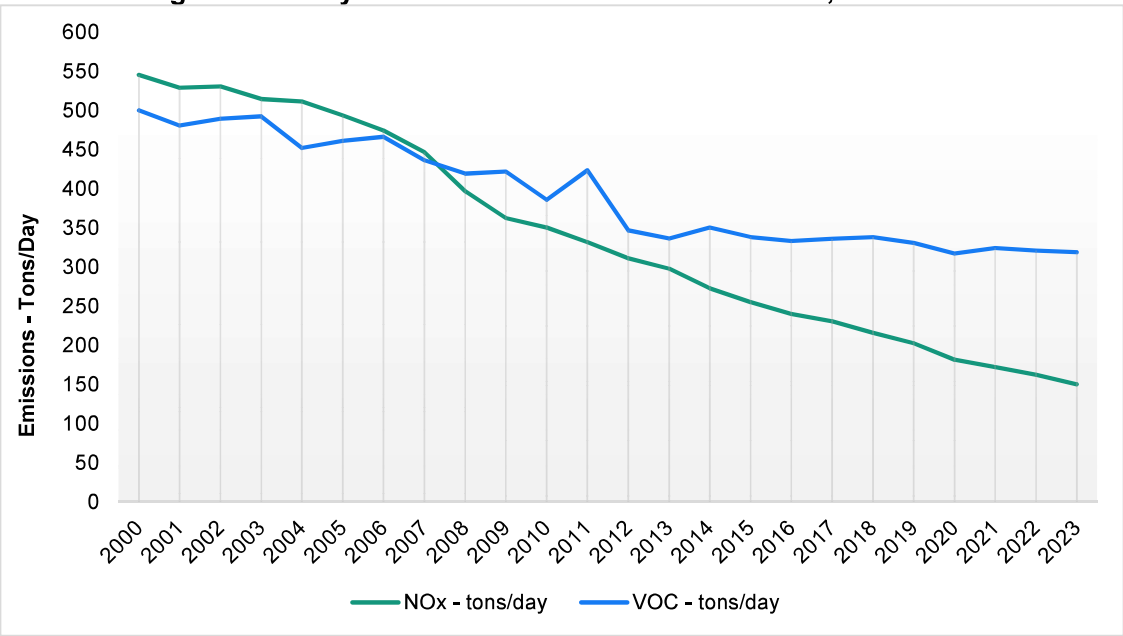
Figure 1 Valley Summer NOx and VOC Emissions, 1990-2023



D.2 Attainment is Not Due to Unusually Favorable Meteorology

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Ozone formation is strongly driven by several factors, including horizontal and vertical ventilation, high pressure, temperature, and solar radiation. These factors contribute to high temperatures on the valley floor. High temperatures can be used as a metric that shows ozone forming potential for a given summer and can be used to compare one ozone season to another. The Valley has maintained attainment of the 1-hour ozone standard from 2013-2022. The analysis in this section shows that the average high temperatures over 2020-2022 were consistent or higher than averages over the 2012-2019 period and that temperatures from 2012-2019 were higher than the temperatures from 1950-2011. Additionally, 2020-2022 did not have lower ozone-forming potential than prior years, and meteorology did not become unusually favorable causing for the Valley to maintain attainment. The Valley is in attainment of the 1-hour ozone standard due to significant investments in cleaner technologies and practices, not because of unusually favorable meteorology.

This section also demonstrates that peak temperature days at Stockton, Modesto, Fresno, and Bakersfield are evenly and normally distributed throughout the May-October ozone season across 2020-2022, similar to the longer 2012-2019 period as shown in the charts below. Furthermore, even when average high temperatures increased, the 1-hour ozone concentrations have decreased in some areas. These results demonstrate that the Valley's improvement in ozone concentrations are not due to unusually favorable meteorology, and that the ozone forming potential during the 2020-2022 period was at least equal to or stronger than longer term averages. It is therefore reasonable to conclude that the reduced ozone concentrations of 2020-2022

and continued attainment of the 1-hour ozone standard are the result of District and CARB emission control programs. For further information on how temperature can effect ozone formation see Appendix B.

Average High Temperatures, 1950-2022

To demonstrate that ongoing and sustained improvements in ozone concentrations are not caused by favorable meteorology, a comparison of daily and average high temperatures was completed for three temperature data sets (1950-2011, 2012-2019, and 2020-2022) over the ozone season each year (May-October). Table 19 reveals that average high temperature and range of daily maximum temperatures over the past three years are greater than (i.e., warmer) or equal to the 62-year average from 1950-2011 and the more recent 8-year average (2012-2019) which covers the period from the District's previous ozone attainment demonstration.

Table 19 Summary of Average High Temperatures and Average Range of Daily Maximum Temperatures during the Ozone Season (May-October)

	1950-2011		2012-2019		2020-2022	
	High Temp (Average)	High Temp (Range)	High Temp (Average)	High Temp (Range)	High Temp (Average)	High Temp (Range)
Stockton	87.2ºF	70.4ºF to 100.4ºF	89.0ºF	76.5ºF to 99.6ºF	90.3ºF	74.1ºF to 98.3ºF
Modesto	87.2ºF	71.7ºF to 100.0ºF	89.2ºF	77.8ºF to 99.9ºF	89.2ºF	73.9ºF to 96.4ºF
Fresno	90.0ºF	72.5ºF to 103.4ºF	92.1ºF	77.2ºF to 102.8ºF	93.4ºF	76.6ºF to 103.3ºF
Bakersfield	90.3ºF	72.6ºF to 102.3ºF	92.0ºF	79.2ºF to 102.8ºF	93.0ºF	77.2ºF to 102.8ºF
Average	88.7ºF	86.7ºF	90.6ºF	89.5ºF	90.5ºF	87.8ºF

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Comparing High Temperature Days to 1-hour Ozone Exceedance Days

A comparison of two sets of data (2012-2019 and 2020-2022) for the 'average number of high temperature days per year' for days with maximum daily temperatures equal to and greater than 95 degrees Fahrenheit reveals a range of values and their average value (Table 20). This table demonstrates that the 2020-2022 'average number of high temperature days per year' are very similar (with an average slightly higher) than those of the previous years of 2012-2019 and that the number of high temperature days per year would not be a causative factor in reduced ozone concentrations that occurred during that time period. See Appendix B for further analysis on the relationship of high temperatures and ozone concentrations.

Table 20 Average Number of High Temperature Days per Year ≥95°F (May-October)

	2012-2019	2020-2022
Stockton	58	72
Modesto	60	62
Fresno	94	98
Bakersfield	93	97
Average	82	89

In Figure 2 through Figure 5, the maximum daily temperatures from 2020-2022 are distributed throughout the ozone season (May-October) similar to the ozone seasons in the previous years of 2012-2019. Since the distribution analysis shows a normal summer temperature distribution for all sites for all 11 years (2012-2022), it can be concluded that the chances for ozone formation for the 2020-2022 seasons were very similar to past seasons and therefore would not be a factor in the overall reduced ozone concentrations. For further evidence on the maximum temperatures measured in the Valley, see Appendix B.

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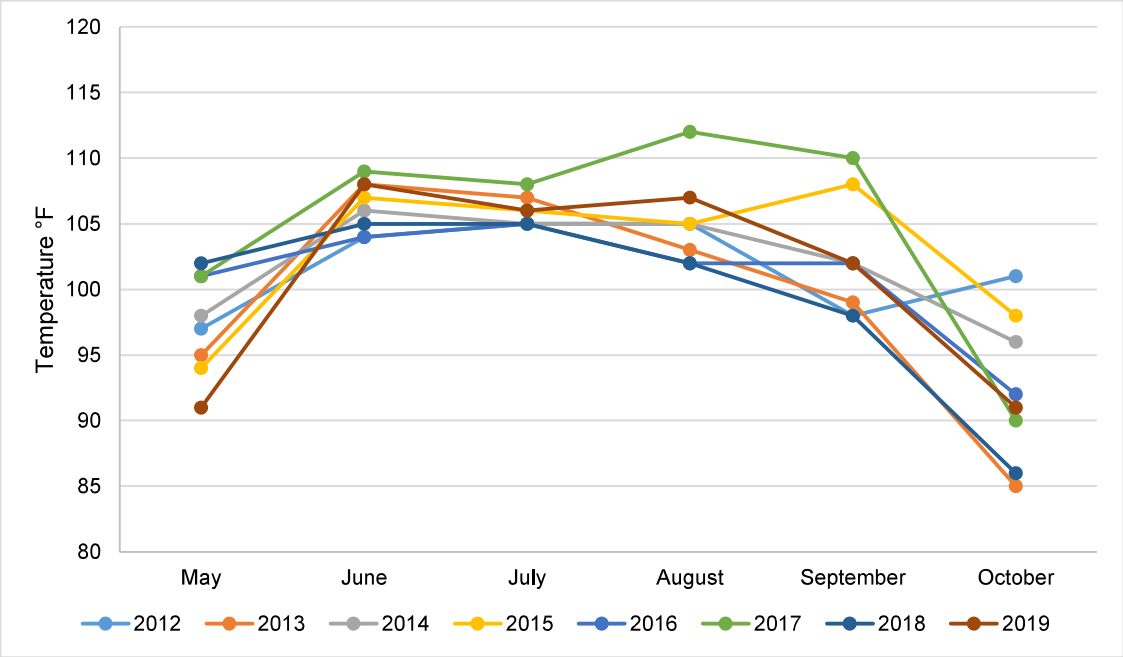
Figure 2 Stockton Airport Maximum Daily Temperatures (°F), May-October (2012-2019 & 2020-2022)



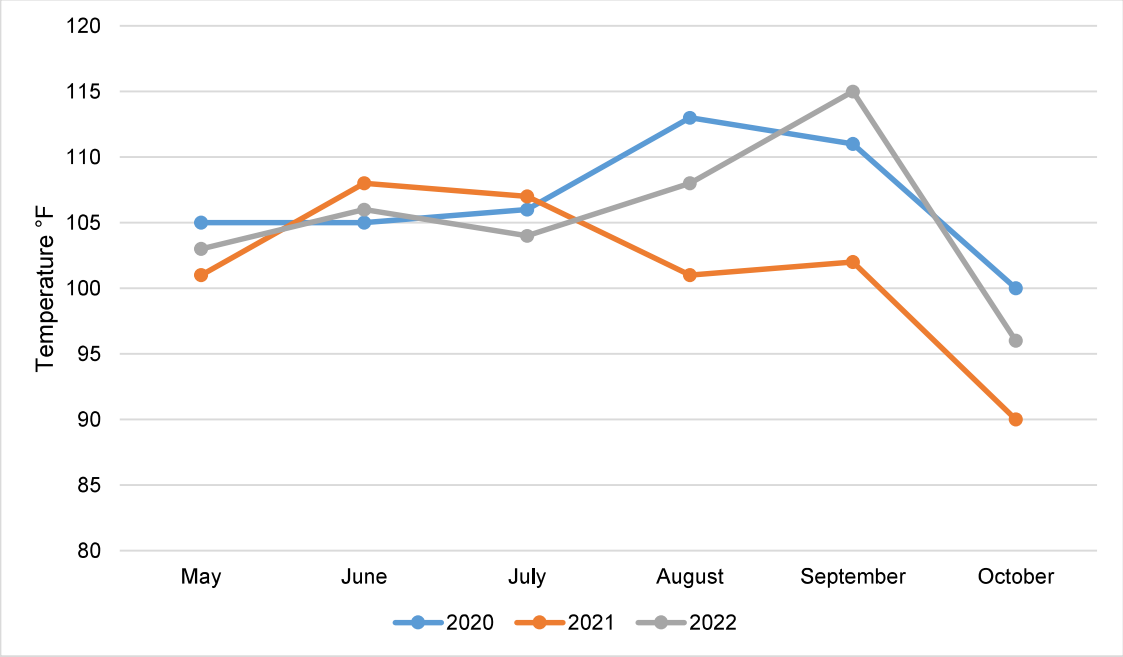


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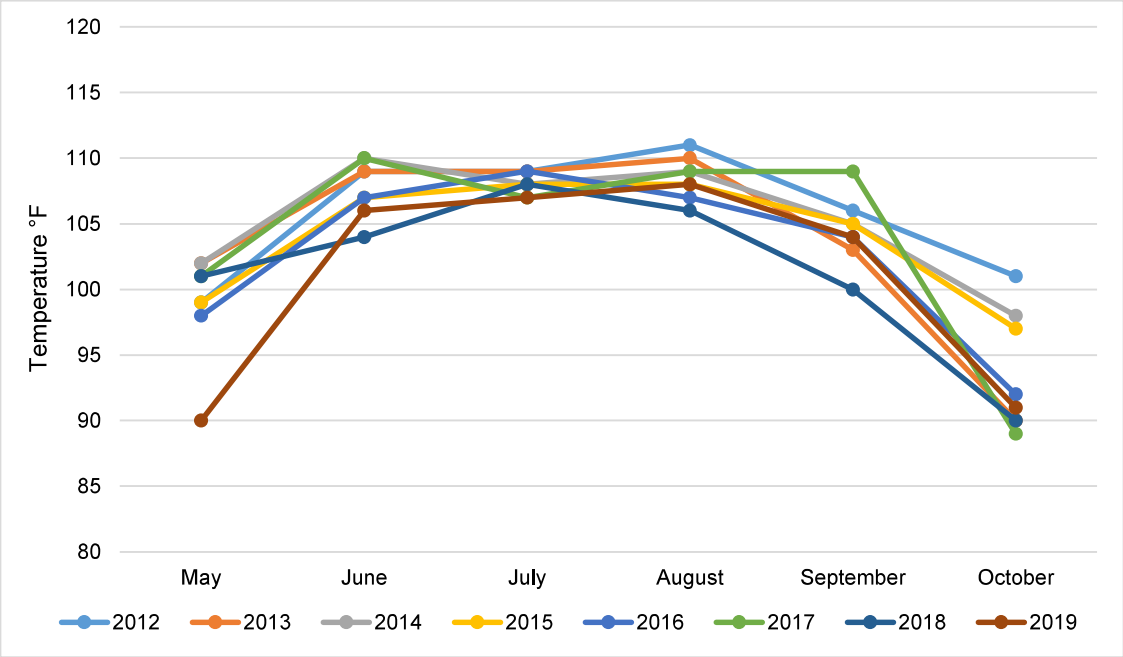
Figure 3 Fresno Yosemite International Airport Maximum Daily Temperatures (°F), May-October (2012-2019 & 2020-2022)



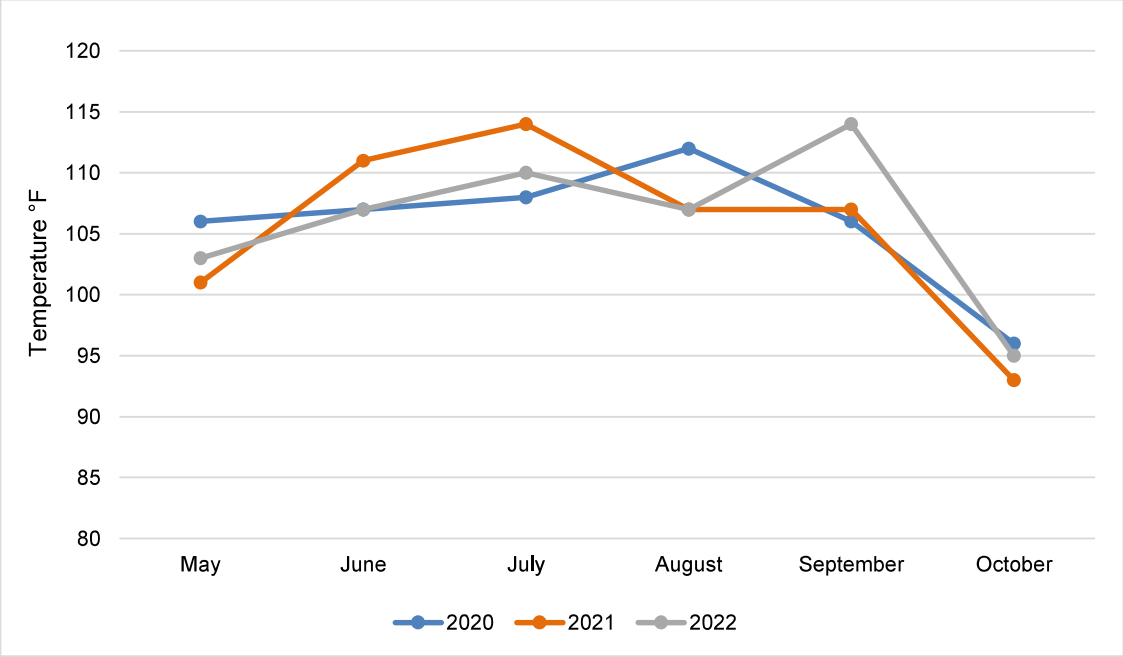


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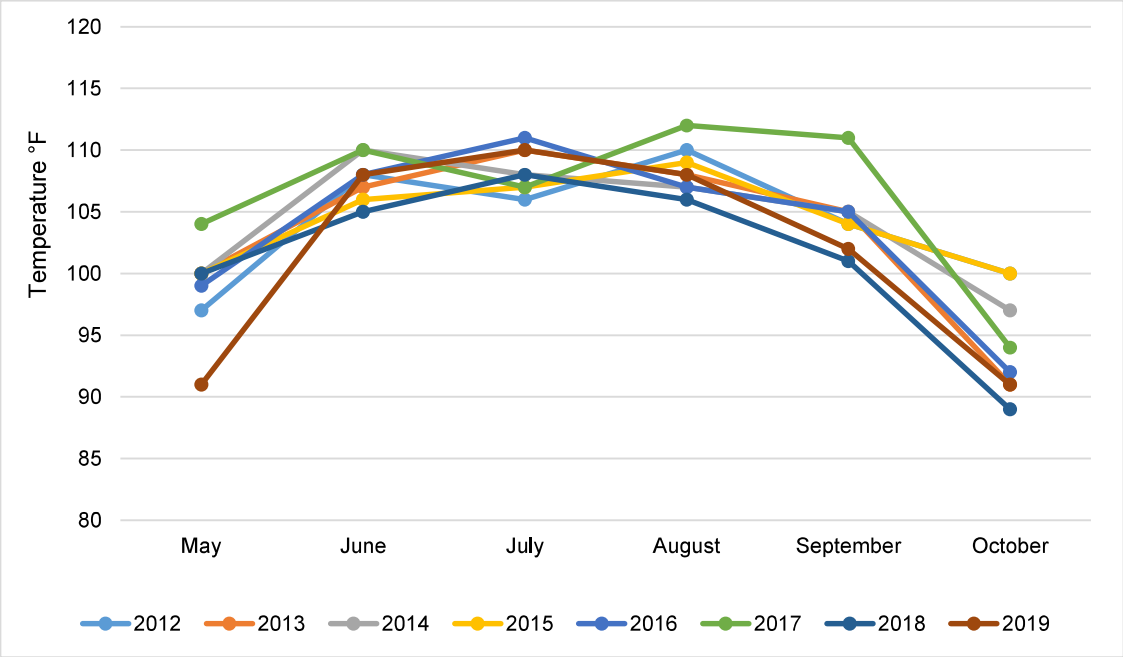
Figure 4 Bakersfield Meadows Airport Maximum Daily Temperatures (°F) May-October (2012-2019 & 2020-2022)



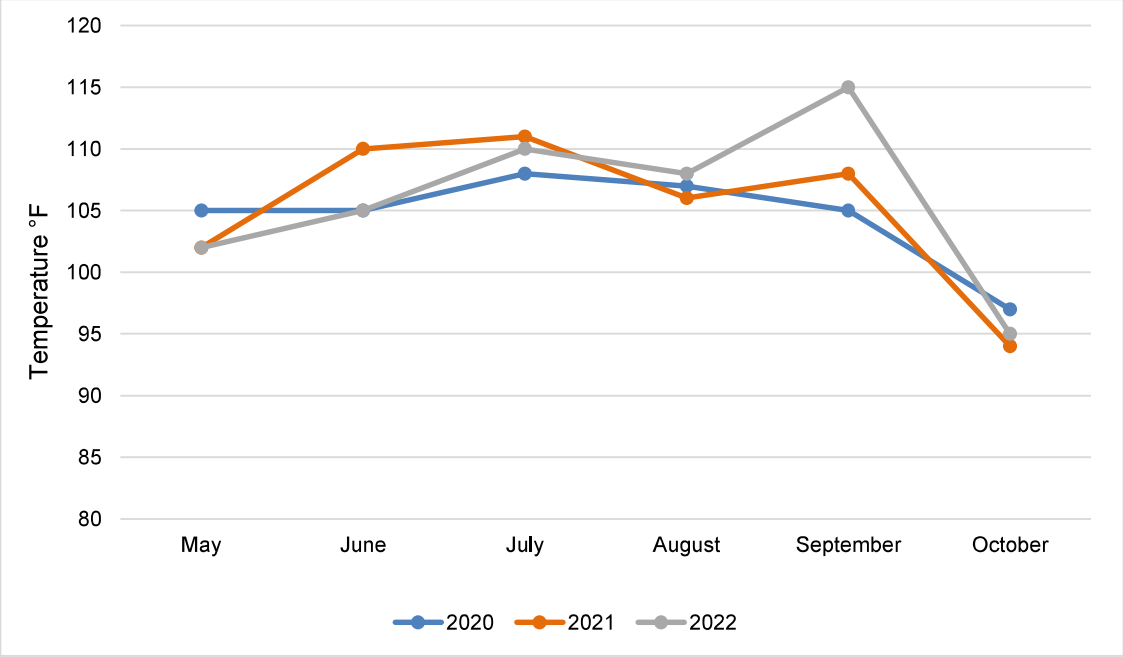


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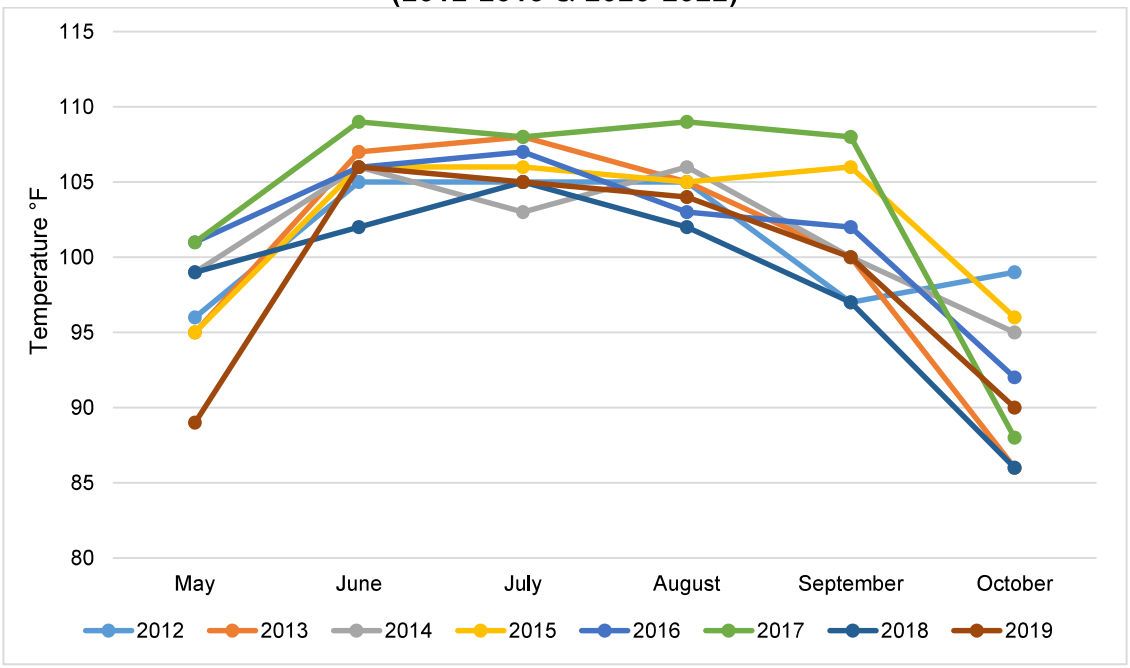
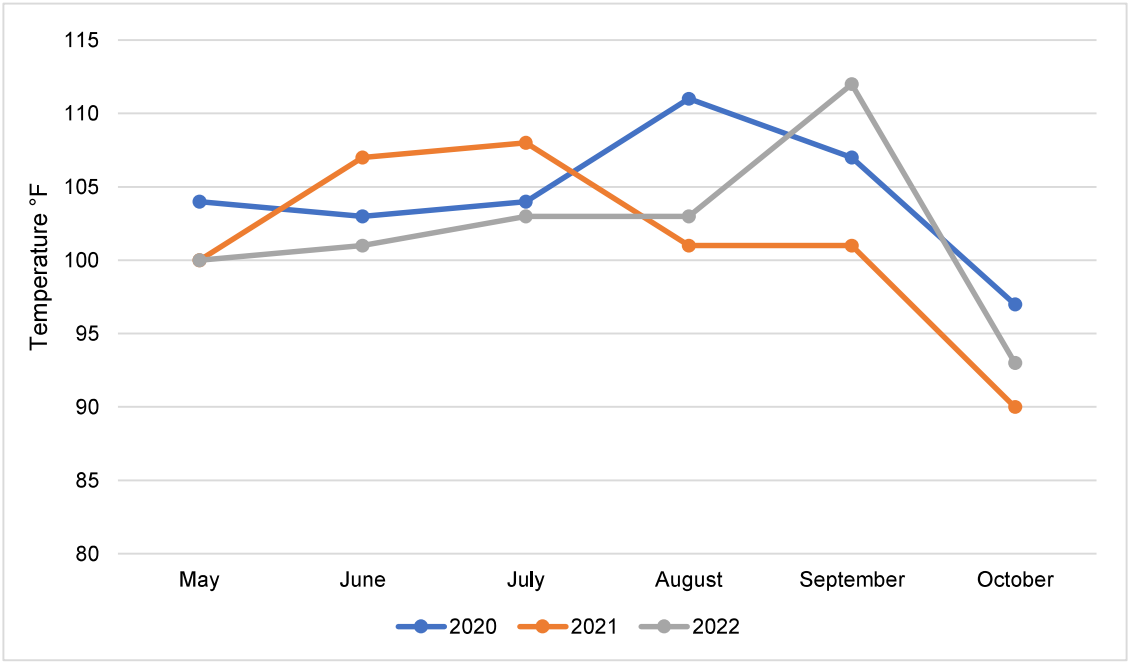
Figure 5 Modesto City Airport Maximum Daily Temperatures (˚F) May October (2012-2019 & 2020-2022)





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Drought in the San Joaquin Valley

Through daily forecasting and through longer-term analysis, the District tracks the ongoing drought and its impact on air quality across the Valley.[17] In general, drought conditions often bring warmer temperatures and longer periods of poor dispersion, which can lead to higher concentrations of pollutants in the Valley.

Beginning in April 2021, the Governor of California signed a set of emergency proclamations directing state agencies to take immediate action to bolster drought resilience across the state, and declared a State of Emergency due to severe drought conditions.[18,19,20]

According to the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) statewide climatological rankings[21], the January 2022 to April 2022 period was the driest on record for California, with a -9.7 inch precipitation deficit. Further, the May 2020 to April 2022 period was the 2nd driest on record. Figure 6 depicts the worsening of the California drought between May 2020 and May 2022.

As drought conditions are often correlated with long periods of poor atmospheric dispersion and warmer temperatures, the District has continued to attain the 1-hour ozone standard through this extreme drought period. This is yet another example that these ongoing improvements are not due to unusually favorable meteorology, but are rather due to permanent emission reductions.

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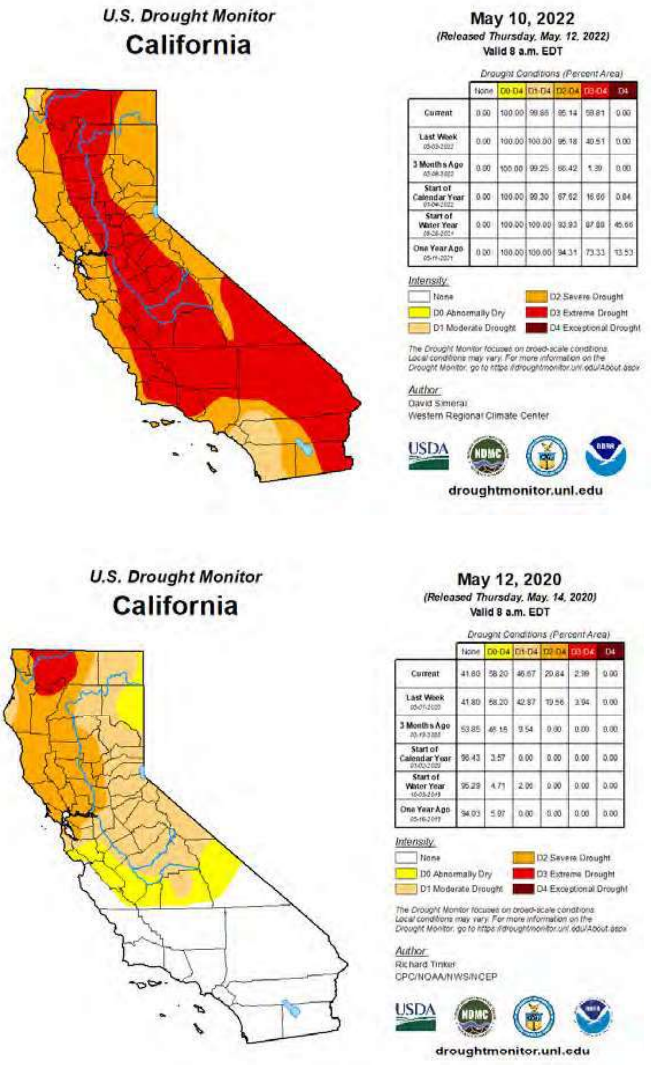
[17] See, for example, the District's April 21, 2022 "Report on the 2021-2022 Winter Residential Woodsmoke Reduction Strategy," (pages A-7 through A-9). Retrieved from: https://www.valleyair.org/Board_meetings/GB/agenda_minutes/Agenda/2022/April/final/11.pdf
[18] Executive Department, State of California. State of Emergency Proclamation. April 2021. Retrieved from: https://www.gov.ca.gov/wp-content/uploads/2021/04/4.21.21-Emergency-Proclamation-1.pdf
[19] Executive Department, State of California. State of Emergency Proclamation. May 2021. Retrieved from: https://www.gov.ca.gov/wp-content/uploads/2021/05/5.10.2021-Drought-Proclamation.pdf
[20] Executive Department, State of California. State of Emergency Proclamation. October 2021. Retrieved from: https://www.gov.ca.gov/wp-content/uploads/2021/10/10.19.21-Drought-SOE-1.pdf
[21] National Oceanic and Atmospheric Administration National Centers for Environmental Information. California Precipitation Rankings, April 2022. Retrieved from: https://www.ncdc.noaa.gov/cag/statewide/rankings/4/pcp/202204

Figure 6 Drought Extent and Severity in California[22]



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[22] National Drought Mitigation Center. U.S. Drought Monitor. Retrieved from: https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?CA

D.3 Attainment is Not Due to Temporary Emissions Reductions

Since the Valley's ozone precursor emissions are dominated by mobile sources which are a key component of economic activity in California, gasoline and diesel fuel sales were analyzed as indicators of economic activity.[23] This analysis shows that the District has continued to maintain attainment since EPA determined the Valley had attained the 1-hour ozone standard in 2016 and that the improvement in ozone throughout 2020-2022 was not due to a temporary economic downturn.

Analysis of California gasoline and diesel sales from May to October shows some variation from year to year, including slight decreases. Figure 7 demonstrates these variations as well as the vehicles miles traveled (VMT) for both gasoline and diesel-fueled vehicles. Even though California gasoline sales and VMT over 2020-2022 were inconsistent as compared to previous years, diesel sales and VMT continued at a steady rate.

Gasoline sales decreased in 2020 as a result of the COVID-19 pandemic; however, it did not play a significant role in the District's continued attainment of the 1-hour ozone standard. The District was in continual attainment of the 1-hour ozone standard in the years since EPA's clean data determination (based on 2012-2014 data), as well as during and after the COVID-19 pandemic. In fact, the Valley experienced a higher number of exceedances in 2020/2021 as a result of California wildfires. Figure 8 displays acres burned statewide from 2013 to 2022.

The Valley's ozone improvement is not attributable to a temporary economic downturn based on the provided analysis. The improvement in the Valley's ozone levels can be attributed to the implementation of new rules in the years since the District attained the 1-hour ozone standard as well as enforcement of rules throughout the District over the past 10 years.

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[23] These were also the economic indicators used in analysis of Sacramento Metropolitan AQMD's 1-hour ozone attainment request. See EPA's proposed approval of their request at 76 FR 28696. Retrieved from: http://www.gpo.gov/fdsys/pkg/FR-2011-05-18/pdf/2011-12063.pdf.

Figure 7 State-Wide Fuel Sales and Vehicle Miles Travelled (May-October)

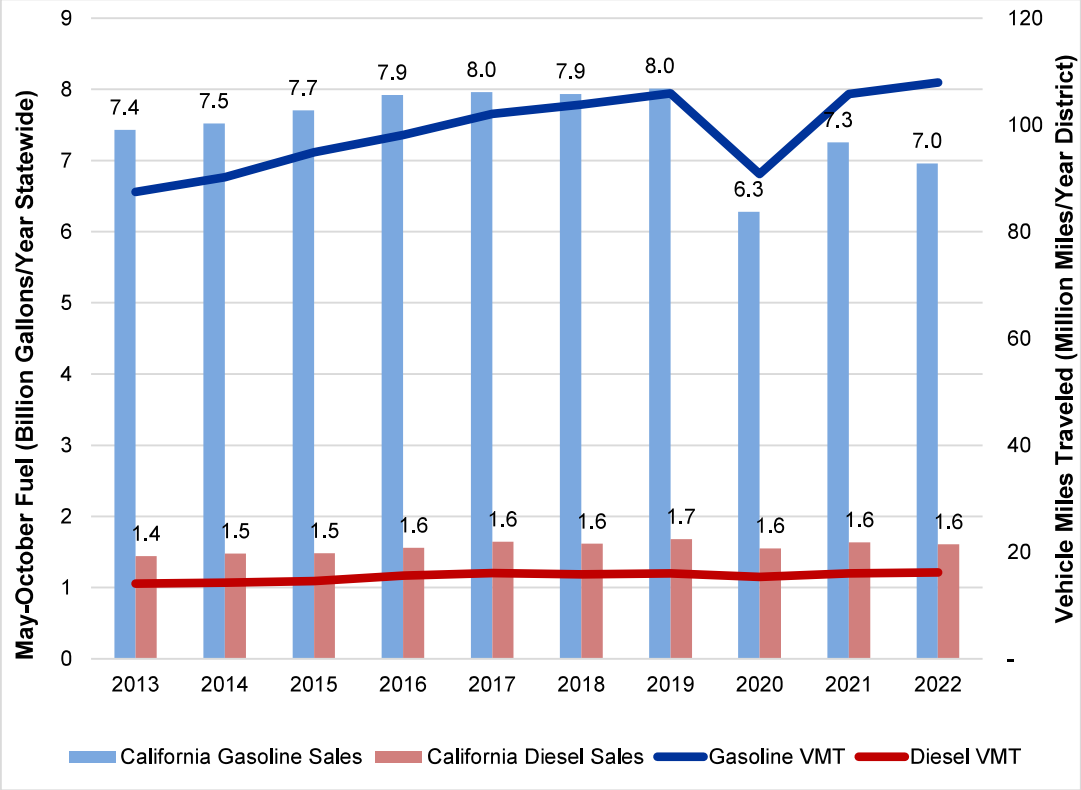

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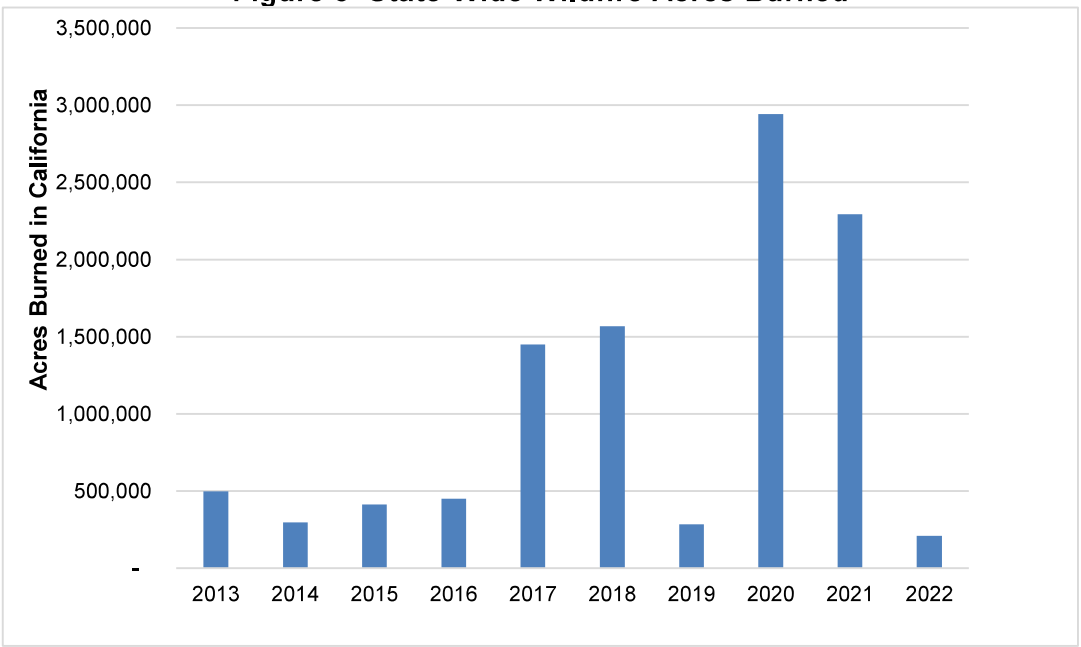
Figure 8 State-Wide Wildfire Acres Burned



D.4 Conclusion

The District has continued to attain the 1-hour ozone standard through permanent and enforceable emission reductions. The Valley has achieved this through stringent District and CARB air quality rules and regulations. Despite the high temperature and drought in the Valley, the District has continued to attain the 1-hour ozone standard. Additionally, attainment of the 1-hour ozone standard was not a result of temporary emission reductions such as an economic downturn. As previously mentioned, the District has continued to be in attainment despite the inconsistency in gasoline sales, VMT, the COVID-19 pandemic, and state-wide wildfires through the period. Therefore, attainment of the 1-hour ozone standard is due to permanent and enforceable emission reductions.

E. SECTION 110 AND PART D REQUIREMENTS

The District has met all 1-hour ozone SIP requirements for the purposes of redesignation under Section 110 of the CAA. In addition, EPA has approved the *2013 Ozone Plan* as meeting Section 110 requirements and as meeting applicable requirements under Part D of Title I of CAA. No outstanding 1-hour ozone SIP submittals exist for the District.

F. MAINTENANCE PLAN

The EPA Office of Air Quality Planning and Standards (OAQPS) memorandum *Procedures for Processing Requests to Redesignate Areas to Attainment*[24] (Calcagni Memo) also provides guidance of what is expected from a maintenance plan under existing policy. The core provisions of a maintenance plan are as follows:

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CONT

Attainment Inventory

- Identify the emission reductions sufficient to attain the NAAQS in the Valley.
- The inventory should be consistent with EPA's most recent guidance on emission inventories for nonattainment areas available at the time and should include the emissions during the time period associated with the monitoring data showing attainment.

Maintenance Demonstration

- Demonstrate maintenance of the NAAQS for another period of ten years following EPA redesignation to attainment by either:
    - Showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory; or
    - Modeling to show that the future mix of sources and emissions rates will not cause a violation of the NAAQS; and

[24] Calcagni, John. Memorandum: *Procedures for Processing Requests to Redesignate Areas to Attainment.* (1992, September 8). United States Environmental Protection Agency Office of Air Quality Planning and Standards. Retrieved from: https://www.epa.gov/ozone-pollution/procedures-processing-requests-redesignate-areas-attainment

- Show that emission rate projections are based on permanent, enforceable reductions.

Air Monitoring Network

- Demonstrate that the state will continue to operate an appropriate air quality monitoring network to verify the attainment status of the area.
- Discuss provisions for continued operation of air quality monitors that will verify attainment.

Verification of Continued Attainment

- Ensure that the state has the legal authority to implement and enforce all measures needed to maintain the NAAQS, including the acquisition of ambient and source emission data.
- Show how continued maintenance of the standard will be tracked.

Contingency Plan

- Verify implementation of emission control measures in the fully approved implementation plan.
- Identify indicators and provisions to promptly correct any violation occurring after redesignation.

The maintenance plan constitutes a SIP revision. EPA has 18 months to act on the maintenance plan. For the purposes of the *2023 Maintenance Plan and Redesignation Request for the Revoked 1-Hour Ozone Standard,* the District is assuming that EPA's action would be complete sometime in the 2025/2026 timeframe. Since the maintenance plan must provide for continued attainment 10 years after designation, the District selected 2036 as the target maintenance year. The sections below address the District's fulfillment of the maintenance plan requirements.

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CONT

F.1 Attainment Inventory

An emissions inventory is a systematic listing of air pollution sources along with the amount of pollution emitted from each source or category over a given time period. Emissions inventory data is used as a primary input to air quality modeling used in attainment demonstrations, developing control strategies, and provide a means to track progress in meeting the emission reduction commitments. Emissions inventories are an estimate of the air pollution emissions that are actually released into the environment—they are not measurements of ambient concentrations. The following are examples of pollution sources grouped by major industry sectors:

- Industrial or stationary point sources – power plants and oil refineries
- Area-wide sources – consumer products and residential fuel combustion
- On-road sources – passenger vehicles and heavy-duty trucks
- Off-road mobile sources – aircraft, trains, ships, recreational boats, construction equipment and farm equipment
- Non-anthropogenic (natural) sources – biogenic (or vegetation), geogenic (petroleum seeps), and wildfires

Emissions Inventory

The emissions inventory for this maintenance plan was generated using the California Emission Projection Analysis Model (CEPAM) 2022, San Joaquin Valley PM2.5 Nonattainment Area - Version 1.00,[25] which is the most comprehensive and current emission inventory for the Valley, and is consistent with EPA's most recent guidance on emissions inventories.

CARB and the District have developed a comprehensive current emissions inventory consistent with the requirements set forth in Section 182(a)-(f) of the CAA[26]. CARB and District staff conducted a thorough review of the inventory to ensure that the emission estimates reflect accurate emissions reports for point sources and that estimates for mobile and areawide sources are based on the most recent approved models and methodologies. CARB also reviewed the growth profiles for point and areawide source categories and updated them as necessary to ensure that the emission projections are based on data that reflect historical trends, current conditions, and recent economic and demographic forecasts.

EPA regulations require that the emissions inventory contains emissions data for precursors; i.e. NOx and VOC[27] for the formation of ozone. The inventory included substitutes VOC with reactive organic gases (ROG), which, in general, represent a slightly broader group of compounds than those in EPA's list of VOCs.

CARB and the District are selecting 2017 as the planning inventory base year for this maintenance plan, and are using the California specific emissions inventory developed through CEPAM.[28] In selecting 2017 as the base year, CARB and the District relied on the Emission Inventory Guidance[29], which allows agencies to consider the availability of data, the implementation of rule requirements, and consistency in the base year across planning and modeling inventories in choosing an appropriate baseline inventory year. 43 CONT

The Emission Inventory Guidance indicates that a common reason for choosing an alternate base year is the desire to have the base year for planning inventories be consistent with the base year for modeling inventories. For modeling purposes, 2019, 2020, and 2021 are not years with representative air quality suitable for modeling future air quality. Modeled attainment demonstrations are based on a five-year weighted design value centered around the base year inventory, giving the base year the most weight. To ensure the model is accurately predicting air quality, it is best to have the base year not be a year of extensive wildfires. Wildfires have become more intense in California. The two largest wildfire years on record occurred in 2020 and 2021. In the

[25] Source: CEPAM 2022 – San Joaquin Valley PM2.5 Nonattainment Area - Version 1.00
[26] Section 182(a)-(f) of the Act. https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapI-partD-subpart2-sec7511a.htm
[27] Section 182(a)(1) of the Act. https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapI-partD-subpart2-sec7511a.htm
[28] Criteria Pollutant and Emission Inventory Data. https://ww2.arb.ca.gov/criteria-pollutant-emission-inventory-data
[29] EPA. Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations. Retrieved from: https://www.epa.gov/sites/default/files/2017-07/documents/ei_guidance_may_2017_final_rev.pdf

Valley, these extensive wildfires impacted air quality throughout the Valley for months. 2020 and 2021 are also unusual, non-representative years due to COVID-19 impacts. Furthermore, in 2020, Valley sites collected incomplete speciation data due to laboratory and monitoring site shutdowns because of the pandemic.

Additionally, CARB and the District prefer to use a National Emissions Inventory (NEI) year as the base year for the inventory, where the two most recent NEI years are 2020 and 2017. However, in 2020, the COVID-19 pandemic affected a range of industries economy-wide, making 2020 emissions atypical; therefore, 2020 is unsuitable for use as a base year for the inventory. Alternatively, the year 2017 did not experience any similar disruption and reflects typical emissions, while retaining the benefits of being an NEI year based on actual emissions data that has undergone quality assurance and quality control (QA/QC) evaluation by EPA.

Using 2017 as the base modeling year ensures that anthropogenic emissions are accurately reflected, speciation data are available and robust, and the model can more accurately reflect the impacts of control strategies; therefore, CARB and the District are using 2017 as the base modeling year. Selecting 2017 for the planning inventory base year would allow for more consistency across the planning and modeling inventories used in this maintenance plan.

Attainment Inventory

EPA requires maintenance plans to present the emissions inventory for the time period used to define attainment for a particular area (Calcagni Memo). As previously mentioned, EPA took final action to determine that the District attained the 1-hour ozone NAAQS through a clean data determination for the period 2012-2014. The final action in the Federal Register states that the District must also, "*submit a demonstration that the area attained the revoked ozone NAAQS due to permanent and enforceable emission reductions and that the area will maintain the revoked NAAQS for 10 years.*" 43 CONT

Therefore, the District is submitting such a demonstration to fulfill these requirements for the 1-hour ozone NAAQS. Since the 2014 clean data determination, the District has continued to maintain the 1-hour ozone NAAQS as demonstrated in section B of the document.

The District has selected the year 2020 as its base year inventory for the 10 year maintenance demonstration (from the 2020-2022 attainment period), projected from the 2017 base year in CEPAM. Table 21 shows NOx emissions totaled 181.29 tons per day (tpd) in 2020, and the VOC emission inventory was 317.05 tpd, both of which are precursors to the formation of ozone. Notably, the emission inventory data reflects a "summer day" as required by EPA in the Calcagni Memo. Appendix A provides a detailed summary of the attainment inventory and projected inventory.

Table 21 2020 Ozone Attainment Inventory

Pollutant	Summer Average Emissions (tpd)
NOx	181.29
VOC	317.05

F.2 Maintenance Demonstration

According to the Calcagni Memo, a state may "*demonstrate maintenance of the NAAQS by either showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory or by modeling to show that the future mix of sources and emission rates will not cause a violation of the NAAQS.*"[30] Consistent with the Calcagni Memo, this maintenance plan demonstrates maintenance of the 1-hour ozone NAAQS by showing that future ozone precursor emissions (NOx and VOC) will not exceed the level of the attainment inventory for at least ten years after redesignation to attainment.

Since the future date of redesignation is undetermined, the District has selected 2026-2036 as the ten year maintenance period. EPA is allowed up to 18 months to perform its review under Section 107(d)(3)(D) of the CAA, and therefore redesignation could potentially occur in the 2025/2026 timeframe.

To demonstrate that the Valley will maintain attainment of the 1-hour ozone NAAQS, this plan demonstrates that projected emissions in 2036 will not exceed those established as the 2020 baseline attainment inventory. If the projected precursors for ozone (NOx and VOC) concentrations in 2036 are lower than the 2020 baseline attainment inventory levels for each, then the District has demonstrated that the Valley will maintain attainment status. Specifically, NOx emissions must stay below 181.29 tpd and VOC emissions must stay below 317.05 tpd. 43 CONT

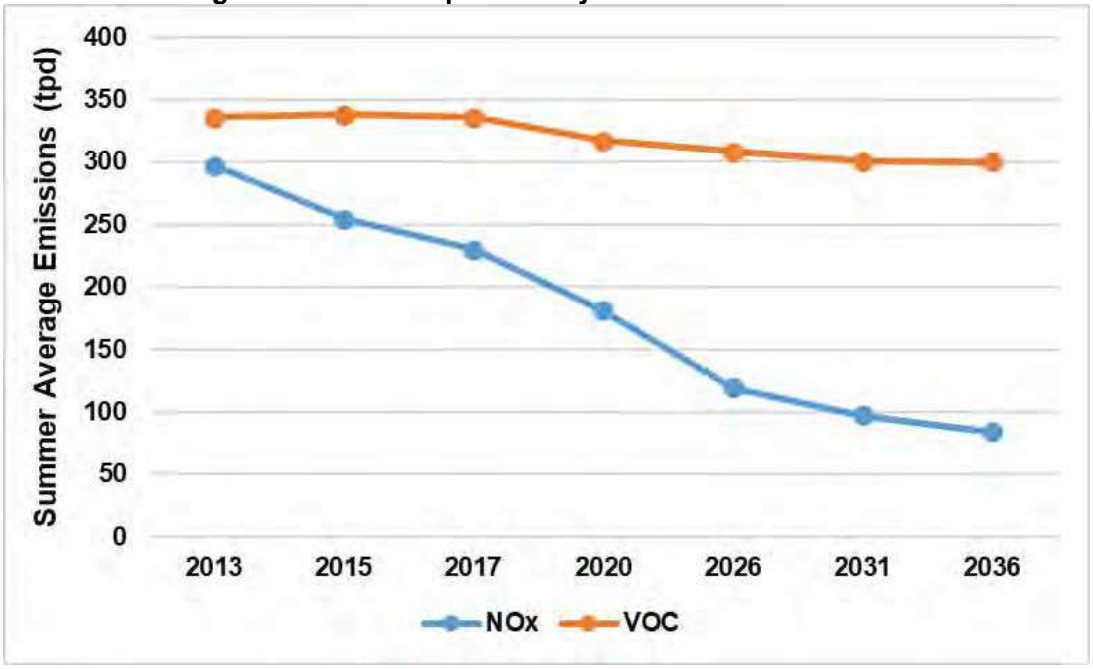
This emissions projection shows that emissions will not increase to a level that would exceed the 1-hour ozone standard. The projected inventory considers future consistent growth, including population and industry, consistent with the attainment inventory, and documents data inputs and assumptions. As demonstrated in Table 22 below, emissions in 2036 are well below the attainment year concentrations. Figure 9 shows that NOx and VOC trends have significantly decreased since the District reached attainment in 2013 and continue to decrease over the ten year demonstration.

Table 22 Ozone Maintenance Demonstration (tpd)

	2020	2026	2031	2036
NOx	181.29	119.5	97.49	84.13
VOC	317.05	308.5	301	300.3

[30] "Procedures for Processing Requests to Redesignate Areas to Attainment," (page 9). Retrieved from: https://www.epa.gov/sites/production/files/2016-03/documents/calcagni_memo_-_procedures_for_processing_requests_to_redesignate_areas_to_attainment_090492.pdf

Figure 9 San Joaquin Valley NOx and VOC Trends



F.3 Monitoring Network

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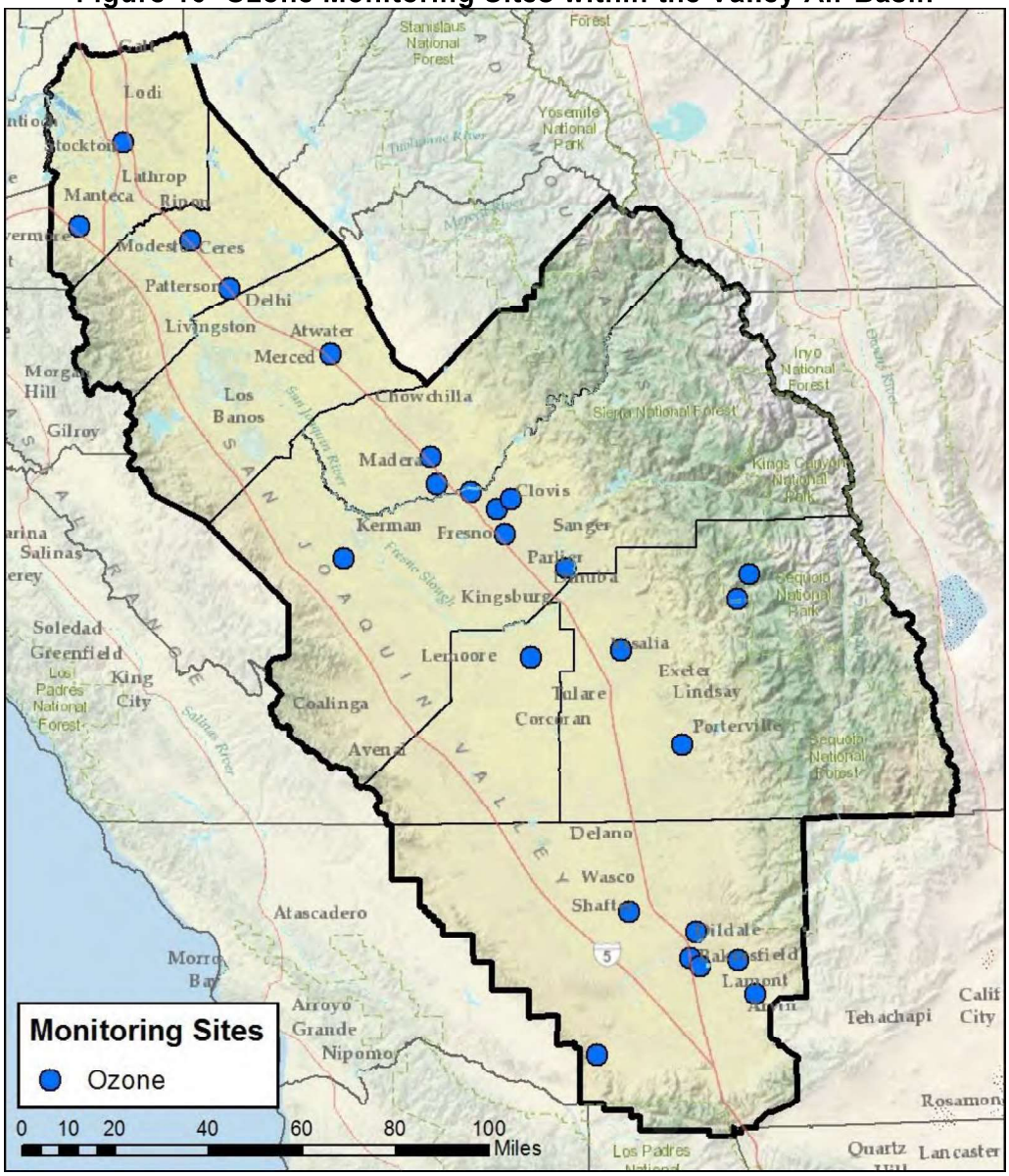
Pursuant to Calcagni Memo requirements, the State shall continue to operate an appropriate air quality monitoring network, in accordance with 40 CFR 58, to verify the attainment status of the area. This maintenance plan contains provisions for continued operation of air quality monitors that will provide such verification.

The District operates and will continue to operate an extensive network of air quality monitors throughout the Valley to support its mission of improving and protecting public health. District staff uses the hourly readings from real-time monitors to communicate the state of the air quality to Valley residents. Through programs and venues such as the EPA AirNow tool, the daily air quality forecast, the District website, and Valley media, residents are able to obtain air quality information that can help them with their activity planning. The District also uses real-time air quality data to manage prescribed burning, agricultural burning, hazard reduction burning, and residential wood combustion to ensure these activities do not result in adverse air quality impacts.

As part of the District's long-term efforts to improve public health, District staff rigorously analyze air monitoring data to ensure the data is of the highest quality. This air monitoring data determines the state of the Valley's air quality and is fundamental in the Valley's effort for continual improvement and to achieve attainment of EPA's health-based ambient air quality standards as quickly as possible.

As a part of this effort, the District and CARB manage the majority of the currently operating 37 air monitoring stations throughout the Valley, 25 of which measure ozone using EPA approved analyzers. The figure below provides a map of the ozone air monitoring stations operating in the Valley. Per requirements outlined in 40 CFR Part 58 Subpart B Section 58.10, the District conducts an assessment of its monitoring network every five years. The assessment includes reevaluating the effectiveness and efficiency of the District's ozone air monitoring network.

Figure 10 Ozone Monitoring Sites within the Valley Air Basin



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Additionally, the most recent information regarding the Valley's air monitoring network has been made available in the *2022 Air Monitoring Network Plan*[31] and is available on the District's website. This plan summarizes monitoring requirements for various pollutants and demonstrates how air monitoring in the Valley meets or exceeds all applicable requirements for State and Local Air Monitoring Stations (SLAMS).

The number of ozone monitors required is determined by population and measured ozone concentrations in metropolitan statistical areas (MSA). There are eight MSAs in the Valley, with each having the same boundaries as the county.[32] Table 23 shows that the Valley meets or exceeds the minimum number of ozone monitors required in each MSA. Figure 10 shows the location of all Valley air monitoring sites.

Ozone monitoring networks are designed to monitor areas with high population densities, areas with high pollutant concentrations, areas impacted by major pollutant sources, and areas representative of background concentrations. Most air monitoring sites in the District represent population exposures and/or maximum concentrations representative of neighborhood and regional scales. Among the ozone monitors operating in the Valley, the majority are suitably located to measure representative concentrations in areas of high population density. The remaining monitors are mostly located in high ozone concentration areas, regions intended to measure air moving into the District, air moving into larger urban areas, and in remote areas to measure background ozone concentrations.

Table 23 Ozone Monitoring Requirements for the Valley

Metropolitan Statistical Area (MSA)	2022 Population	Highest 2022 8-hour Ozone Design Value in MSA (ppb)	≥85% of 2008 8-hour ozone NAAQS (75 ppb)	Number of monitors required	Number of active SLAMS ozone monitor sites
Bakersfield[33]	909,813	87	Yes	2	7
Fresno	1,011,273	84	Yes	2	6
Hanford-Corcoran	152,023	78	Yes	1	1
Madera	157,396	78	Yes	1	2
Merced	284,338	76	Yes	1	1
Modesto	549,466	79	Yes	2	2
Stockton	784,298	66	Yes	2	2
Visalia- Porterville	475,014	89	Yes	2	2

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[31] SJVAPCD. *2022 Air Monitoring Network Plan.* (October 11, 2022). Retrieved from: https://ww2.valleyair.org/air-quality-information/air-monitoring/

[32] 40 CFR 58 Appendix D, Table D-2. Retrieved from: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-58

[33] Air monitors in the Eastern Kern County Air Pollution Control District would count towards the monitors required for the Bakersfield MSA. However, the "Number of active ozone monitors" listed here includes those only in the Valley Portion of Kern County.

EPA requires air monitoring agencies to include a variety of monitoring site types in their air monitoring networks. The monitoring site types within the District's ozone monitoring network measure concentrations for population exposure, highest concentrations, regional transport, and background levels. Often more than one monitoring site type applies to a given location. Table 24 identifies the monitoring site types for the ozone monitoring sites operating in the Valley.

Table 24 Ozone Monitoring Site Types in 2023

Site Name	Population Exposure	Highest Concentration	Regional Transport	Background Levels
Stockton-University Park*	x	x		
Tracy-Airport			x	
Modesto-14th St*	x	x		
Turlock	x	x		
Merced-Coffee	x	x		
Madera-City		x		x
Madera-Pump Yard		x		x
Tranquility	x			
Fresno-Sky Park	x	x	x	
Clovis-Villa	x	x		
Fresno-Garland*	x	x		
Fresno-Drummond	x	x	x	
Parlier		x	x	
Hanford-Irwin	x	x		
Visalia-Ashland*				x
Porterville	x	x		
Ash Mountain^		x	x	
Lower Kaweah^			x	
Shafter*	x			x
Oildale*		x	x	
Bakersfield-California*		x		x
Edison*		x	x	
Bakersfield-Muni		x		
Arvin-Di Giorgio*	x	x		
Maricopa		x	x	

^Monitor operated by the National Park Service
*Monitor operated by CARB

Additionally, the District annually participates in EPA's enhanced Photochemical Assessment Monitoring Stations (PAMS) program. PAMS sites measure ozone precursors, including NOx and VOC, in addition to a variety of meteorological parameters in serious, severe, or extreme ozone nonattainment areas. Table 25 identifies the PAMS monitoring site types operating in the Valley.

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Table 25 San Joaquin Valley PAMS Network

MSA	Site	Site Type
Fresno	Madera-Pump Yard	Type 1: Upwind/Background site
	Clovis-Villa	Type 2: Maximum precursor emissions
	Parlier	Type 3: Maximum ozone concentrations
Bakersfield	Shafter	Type 1: Upwind/Background site
	Bakersfield-Muni	Type 2: Maximum precursor emissions
	Arvin-Di Giorgio*	Type 3: Maximum ozone concentrations

*PAMS equipment may be installed for the Type 3 site at the Arvin-Di Giorgio when space becomes available.

F.4 Verification of Continued Attainment

The District is a duly constituted unified district as provided in California Health and Safety Code (CH&SC) sections 40150 to 40161, and as such has regulatory authority under these and other sections of the CH&SC to issue permits, collect fees, impose penalties, develop rules, regulations and plans, and collect air monitoring and emissions data. This authority continues after redesignation to attainment.

The District will continue the operation of the ozone air monitoring to verify ongoing attainment of the 1979 1-hour ozone NAAQS. EPA's Final Rule providing revisions to ambient air quality regulations (71 *FR* 61236) required development and submittal of an annual air monitoring network plan. As such, the District will continue to develop and make available its annual air monitoring network plan document, which includes details of its ozone air monitoring network, and a summary of the previous year's peak ozone concentrations, which can be used to track progress and continued verification of attainment. The District submitted the *2022 Air Monitoring Network Plan* to EPA on October 11, 2022, as available on the District's website.[34]

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In addition, to track progress of the San Joaquin Valley toward continued attainment of the 1-hour ozone NAAQS, the District and CARB will continue to develop and submit periodic emissions inventories to the EPA as growth and control projections change and as emission factors are updated. The District and CARB commit to reviewing the emissions inventories to determine whether any changes could affect the maintenance of the 1-hour ozone NAAQS, which will contribute to the verification of continued attainment of this standard for the San Joaquin Valley.

F.5 Contingency Plan

[This section prepared in collaboration with the California Air Resources Board]

For maintenance plans, CAA Section 175A(d) requires contingency provisions to assure

[34] SJVAPCD. *2022 Air Monitoring Network Plan*. (October 11, 2022). Retrieved from: https://www.valleyair.org/aqinfo/Docs/2022-Air-Monitoring-Network-Plan.pdf

prompt correction of any post-redesignation NAAQS violations. As clarified in the Calcagni Memo, the contingency plan for a maintenance plan differs from that of an attainment plan. For the purposes of Section 175A, a State is not required to have fully adopted contingency measures that will take effect without further action by the State in order for the maintenance plan to be approved. The maintenance contingency plan should ensure that the contingency measures are adopted expediently once they are triggered. Maintenance plan contingencies should include specific triggers that will be used to determine when the contingency measures need to be implemented. Possible triggers are emissions inventory "action levels" or NAAQS violations (monitored or modeled) with a specific time limit for appropriate State actions, including a control measure adoption schedule and procedures for adoption and implementation.

The District is selecting an action level equivalent to the attainment test for the 1-hour ozone NAAQS of 124 ppb, where the action level would be triggered should any of the air monitoring sites average above 1.0 expected exceedances over a 3-year period of certified air monitoring data. Should the action level be reached, the District will evaluate the event and take appropriate action within 18 months following a monitored and certified violation of the NAAQS. Should this evaluation conclude that the ozone exceedances leading to a violation of the 1-hour ozone standard were due to impacts from exceptional events, the District will follow EPA's Exceptional Events Initial Notification procedures to determine what documentation would need to be prepared for EPA review and approval.

However, if the air quality monitoring data indicates that the area has violated the 1-hour ozone NAAQS due to ozone readings not influenced by exceptional events as discussed above, the District and CARB commit to evaluating rules and adopting amendments where an opportunity is identified, including but not limited to the rules within Table 26 and Table 27. While EPA has not committed to reviewing federal mobile source measures as a component of contingency, the District and CARB will also continue to advocate for needed assistance and action from EPA to address federal mobile source emissions that contribute significant portions of Valley ozone precursor emissions (see Section G, below). 43 CONT

Since the implementation of potential contingency measures would not be expected to take place until well in the future, the identification of specific detailed measures is not practical. The most appropriate contingency measures may be significantly different from the measures mentioned below due to technological, economic, and other factors in the future.

Table 26 District Rules for Evaluation

Rule	Title
Rule 4306/4320	Boiler, Steam Generators, and Process Heaters > 5 MMBtu/hr
Rule 4307	Boilers, Steam Generators, and Process Heaters - 2.0 MMBtu/hr to 5.0 MMBtu/hr
Rule 4308	Boilers, Steam Generators, and Process Heaters - 0.075 MMBtu/hr to 2.0 MMBtu/hr
Rule 4309	Dryers, Dehydrators, and Ovens
Rule 4311	Flares
Rule 4352	Solid Fuel Fired Boilers, Steam Generators, and Process Heaters
Rule 4354	Glass Melting Furnaces
Rule 4702	Internal Combustion Engines
Rule 4703	Stationary Gas Turbines
Rule 4902	Residential Water Heaters
Rule 4905	Natural Gas Fired, Fan-type Central Furnaces

Table 27 CARB Measures from 2022 State SIP Strategy

Proposed Measure	Agency	Action	Implementation Begins
On-Road Heavy-Duty			
Advanced Clean Fleets Regulation	CARB	2023	2024
Zero-Emissions Trucks Measure	CARB	2028	2030
On-Road Light-Duty			
On-Road Motorcycle New Emissions Standards	CARB	2022	2025
Clean Miles Standard	CARB	2021	2023
Off-Road Equipment			
Tier 5 Off-Road Vehicles and Equipment	CARB	2025	2029
Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation	CARB	2022	2024
Transport Refrigeration Unit Regulation Part 2	CARB	2026	2028
Commercial Harbor Craft Amendments	CARB	2022	2023
Cargo Handling Equipment Amendments	CARB	2025	2026
Off-Road Zero-Emission Targeted Manufacturer Rule	CARB	2027	2031
Clean Off-Road Fleet Recognition Program	CARB	2025	2027
Spark-Ignition Marine Engine Standards	CARB	2029	2031
Other			
Consumer Products Standards	CARB	2027	2028
Zero-Emission Standard for Space and Water Heaters	CARB	2025	2030
Enhanced Regional Emission Analysis in State Implementation Plans[35]	CARB	2025	2023
Pesticides: 1,3-Dichloropropene Health Risk Mitigation	DPR	2022	2024
Primarily-Federally and Internationally Regulated Sources – CARB Measures			
In-Use Locomotive Regulation	CARB	2023	2024
Future Measures for Aviation Emissions reductions	CARB	2027	2029

**Table provided by the California Air Resources Board*

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[35] Proposed CARB finalization

G. FEDERAL MOBILE SOURCE OPPORTUNITIES

The District has promulgated and implemented measures to reduce emissions from sources of air pollution under its regulatory authority. The District has also deployed innovative measures to reduce emissions from mobile and indirect sources of air pollution that fall outside its traditional regulatory authority with stationary sources. CARB's primary regulatory authority is the regulation of mobile sources of emissions. Mobile sources are the largest contributor to criteria pollutant and air toxic emissions (e.g. diesel particulate matter) in the Valley and throughout the State. District and CARB efforts in developing and implementing emission reduction measures has contributed to the substantial improvements in Valley air quality, and will continue to do so in the future.

Although CARB has promulgated stringent mobile source measures for vehicles and fleets in California, emissions from interstate heavy-duty trucks, locomotives, and other federal mobile sources have not been reduced as significantly. To provide context on the make-up of the remaining sources of emissions in the Valley, mobile sources now account for over 80% of NOx emissions in the region, with statewide mobile source emissions under federal jurisdiction now surpassing those under California jurisdiction. As the District and CARB's ongoing efforts have significantly improved air quality in the San Joaquin Valley, it is becoming critically important for the EPA to be strong partners in reducing emissions in California and the Valley. The District and CARB are committed to continued partnership with EPA to identify opportunities to further reduce emissions from federal sources in the San Joaquin Valley. 43 CONT

H. SUMMARY CHECKLIST

As described in section B of the document, the air monitoring data provided demonstrates that the District continues to be in attainment of the 1-hour ozone NAAQS. Section C and E demonstrate that the District has met all applicable Section 110 requirements of the CAA. Additionally, the District shows in section D that the emission reductions achieved are permanent and enforceable.

Table 28 summarizes the status of the elements that need to be satisfied in order to meet CAA requirements for Section 175A as outlined in the Calcagni Memo. Sections F.1 and F.2 of the document demonstrates continued attainment of the 1-hr ozone NAAQS through 2036. Section F.3 commits the District to maintain the ongoing ozone air monitoring network. Section F.4 commits the District to verify continued attainment of the 1-hour ozone NAAQS by reviewing information and assumptions used for the emission inventory when new information becomes available. If the District finds that this information has changed significantly, the District will update the existing emissions inventory in coordination with CARB, evaluate the revised inventory against the inventories presented in this maintenance plan, and evaluate the potential impacts. Section F.5 commits to establish a contingency plan that is triggered by a measured violation of the 1-hour ozone NAAQS.

Table 28 Summary Checklist of Document References

CAA/U.S. EPA Requirements	Status	Document Reference
Attainment inventory	Conditions met	Section F.1
Maintenance demonstration	Conditions met	Section F.2
Monitoring network	Commitment established	Section F.3
Verification of continued attainment	Commitment established	Section F.4
Contingency Plan	Commitment established	Section F.5

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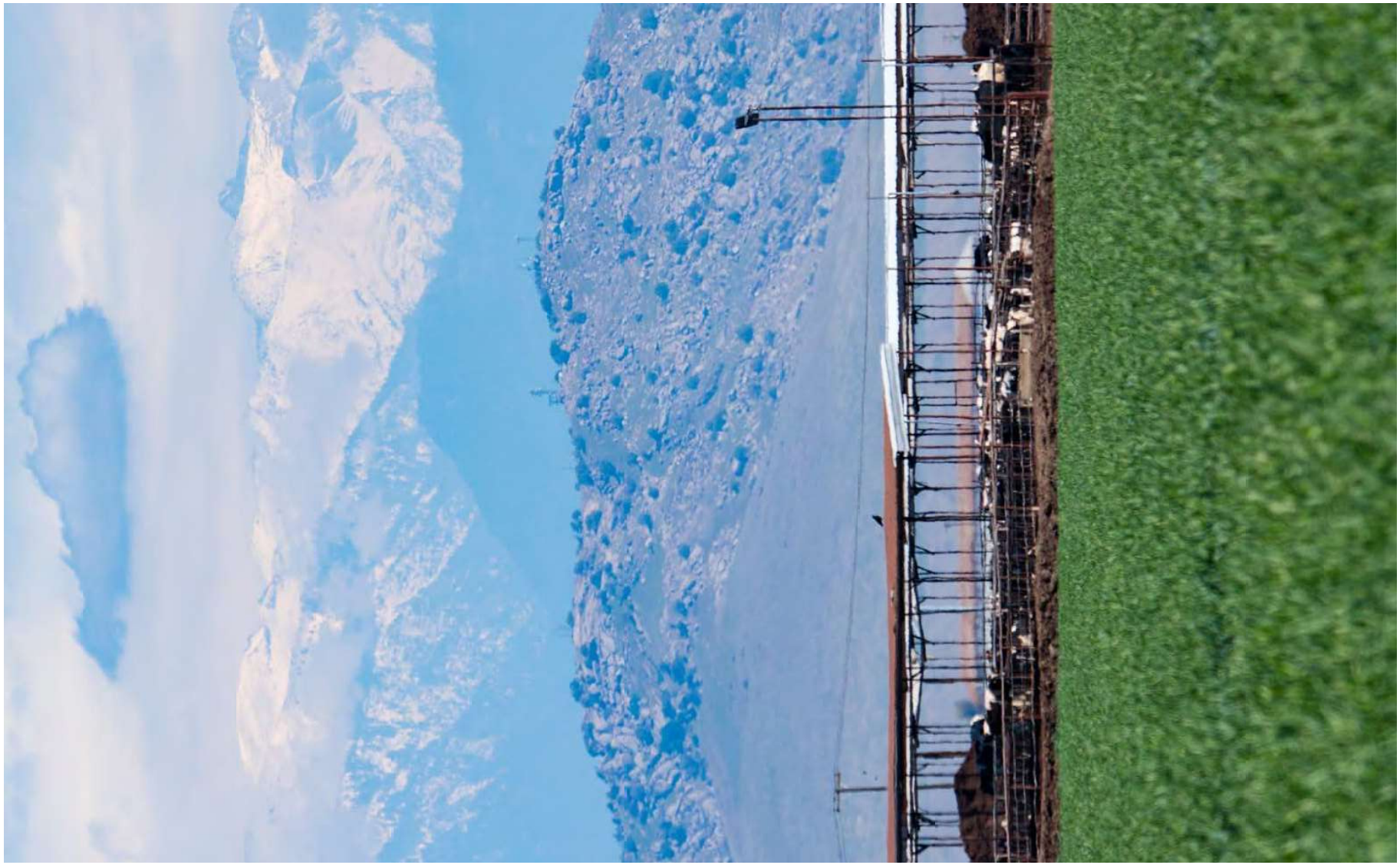
Appendix A

Emissions Inventory



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APPENDIX A: EMISSIONS INVENTORY

This Appendix contains the following emissions inventory tables:

- Table A-1 NOx Inventories, Summer Daily Averages (tons/day)
- Table A-2 VOC Inventories, Summer Daily Averages (tons/day)

These tables include summer average tons per day emissions for the years 2013, 2015, 2017, 2020, 2026, 2031, and 2036. The base year (the year from which the inventory is projected forward and backward) for these inventories is 2017. The year 2020 is the base year used in the maintenance demonstration to project forward to the year 2036.

Table A-1 NOx Emissions (Summer Daily Averages in Tons per Day)

NOX SUMMER AVERAGE (tons/day)							
SUMMARY CATEGORY NAME	**2013**	**2015**	**2017**	**2020**	**2026**	**2031**	**2036**
STATIONARY SOURCES							
FUEL COMBUSTION							
ELECTRIC UTILITIES	3.89	4.11	2.84	2.69	2.48	2.23	2.19
COGENERATION	1.62	0.88	0.74	0.71	0.72	0.73	0.83
OIL AND GAS PRODUCTION (COMBUSTION)	3.44	3.32	2.75	2.42	1.75	1.38	1.19
PETROLEUM REFINING (COMBUSTION)	0.19	0.14	0.24	0.22	0.18	0.16	0.16
MANUFACTURING AND INDUSTRIAL	1.82	1.78	1.59	1.61	1.48	1.46	1.52
FOOD AND AGRICULTURAL PROCESSING	14.95	10.35	7.12	6.23	4.71	3.74	3.46
SERVICE AND COMMERCIAL	7.47	4.27	4.26	4.39	3.80	3.66	3.58
OTHER (FUEL COMBUSTION)	0.84	0.72	0.68	0.57	0.57	0.57	0.57
*** TOTAL FUEL COMBUSTION**	**34.22**	**25.57**	**20.20**	**18.82**	**15.68**	**13.91**	**13.48**
WASTE DISPOSAL							
SEWAGE TREATMENT	0.04	0.04	0.05	0.05	0.04	0.04	0.04
LANDFILLS	0.18	0.18	0.23	0.24	0.15	0.16	0.17
INCINERATORS	0.05	0.04	0.04	0.04	0.04	0.04	0.04
SOIL REMEDIATION	0.01	0.01	0.00	0.00	0.00	0.00	0.00
OTHER (WASTE DISPOSAL)	0.00	0.01	0.01	0.01	0.01	0.01	0.01
*** TOTAL WASTE DISPOSAL**	**0.27**	**0.27**	**0.32**	**0.33**	**0.23**	**0.24**	**0.25**

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CONT

NOX SUMMER AVERAGE (tons/day)							
SUMMARY CATEGORY NAME	**2013**	**2015**	**2017**	**2020**	**2026**	**2031**	**2036**
CLEANING AND SURFACE COATINGS							
LAUNDERING	0	0	0	0	0	0	0
DEGREASING	0	0	0	0	0	0	0
COATINGS AND RELATED PROCESS SOLVENTS	0	0	0	0	0	0	0
PRINTING	0	0	0	0	0	0	0
ADHESIVES AND SEALANTS	0	0	0	0	0	0	0
OTHER (CLEANING AND SURFACE COATINGS)	0	0	0	0	0	0	0
*** TOTAL CLEANING AND SURFACE COATINGS**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PETROLEUM PRODUCTION AND MARKETING							
OIL AND GAS PRODUCTION	0.27	0.24	0.23	0.21	0.10	0.09	0.08
PETROLEUM REFINING	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PETROLEUM MARKETING	0.04	0.06	0.06	0.06	0.05	0.05	0.05
OTHER (PETROLEUM PRODUCTION AND MARKETING)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*** TOTAL PETROLEUM PRODUCTION AND MARKETING**	**0.31**	**0.31**	**0.30**	**0.28**	**0.17**	**0.15**	**0.13**
INDUSTRIAL PROCESSES							
CHEMICAL	0.34	0.28	0.32	0.31	0.32	0.34	0.37
FOOD AND AGRICULTURE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MINERAL PROCESSES	0.22	0.23	0.25	0.23	0.24	0.24	0.24
METAL PROCESSES	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WOOD AND PAPER	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GLASS AND RELATED PRODUCTS	5.70	2.95	3.08	3.16	2.79	1.75	1.75
ELECTRONICS	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OTHER (INDUSTRIAL PROCESSES)	0.00	0.00	0.01	0.01	0.01	0.01	0.01
*** TOTAL INDUSTRIAL PROCESSES**	**6.26**	**3.46**	**3.66**	**3.71**	**3.36**	**2.33**	**2.37**
**** TOTAL STATIONARY**	**41.06**	**29.61**	**24.49**	**23.14**	**19.43**	**16.63**	**16.23**

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CONT

NOX SUMMER AVERAGE (tons/day)							
SUMMARY CATEGORY NAME	**2013**	**2015**	**2017**	**2020**	**2026**	**2031**	**2036**
AREAWIDE SOURCES							
SOLVENT EVAPORATION							
CONSUMER PRODUCTS	0	0	0	0	0	0	0
ARCHITECTURAL COATINGS AND RELATED PROCESS SOLVENTS	0	0	0	0	0	0	0
PESTICIDES/FERTILIZERS	0	0	0	0	0	0	0
ASPHALT PAVING / ROOFING	0	0	0	0	0	0	0
*** TOTAL SOLVENT EVAPORATION**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
MISCELLANEOUS PROCESSES							
RESIDENTIAL FUEL COMBUSTION	3.58	2.94	3.15	3.03	2.73	2.57	2.36
FARMING OPERATIONS	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CONSTRUCTION AND DEMOLITION	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PAVED ROAD DUST	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UNPAVED ROAD DUST	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FUGITIVE WINDBLOWN DUST	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FIRES	0.03	0.03	0.03	0.03	0.04	0.04	0.04
MANAGED BURNING AND DISPOSAL	0.84	2.65	4.65	4.30	1.38	1.37	1.36
COOKING	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OTHER (MISCELLANEOUS PROCESSES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*** TOTAL MISCELLANEOUS PROCESSES**	**4.46**	**5.63**	**7.83**	**7.37**	**4.14**	**3.98**	**3.77**
**** TOTAL AREAWIDE**	**4.46**	**5.63**	**7.83**	**7.37**	**4.14**	**3.98**	**3.77**
MOBILE SOURCES							
ON-ROAD MOTOR VEHICLES							
LIGHT DUTY PASSENGER (LDA)	10.03	8.29	6.47	4.20	2.69	1.87	1.17
LIGHT DUTY TRUCKS - 1 (LDT1)	2.60	2.12	1.73	1.24	0.65	0.34	0.17
LIGHT DUTY TRUCKS - 2 (LDT2)	7.12	6.36	5.20	3.14	2.02	1.46	1.04
MEDIUM DUTY TRUCKS (MDV)	8.60	7.70	6.86	4.66	2.45	1.45	0.95

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CONT

NOX SUMMER AVERAGE (tons/day)							
SUMMARY CATEGORY NAME	**2013**	**2015**	**2017**	**2020**	**2026**	**2031**	**2036**
LIGHT HEAVY DUTY TRUCKS - 1 (LHDT1)	9.45	8.67	7.94	5.73	3.87	2.27	1.31
LIGHT HEAVY DUTY TRUCKS - 2 (LHDT2)	2.26	2.17	2.02	1.49	1.09	0.72	0.48
MEDIUM HEAVY DUTY TRUCKS (MHDT)	11.63	10.11	9.22	5.01	2.01	1.30	0.90
HEAVY HEAVY DUTY TRUCKS (HHDT)	90.01	67.33	56.65	34.51	12.28	9.53	9.09
MOTORCYCLES (MCY)	0.34	0.32	0.29	0.22	0.20	0.17	0.15
BUSES	1.86	1.68	1.50	0.91	0.54	0.37	0.22
MOTOR HOMES (MH)	0.31	0.28	0.26	0.19	0.16	0.12	0.09
*** TOTAL ON-ROAD MOTOR VEHICLES**	**144.20**	**115.02**	**98.14**	**61.28**	**27.95**	**19.57**	**15.57**
OTHER MOBILE SOURCES							
AIRCRAFT	2.54	2.54	2.53	4.62	4.60	4.59	4.59
TRAINS	10.58	12.86	13.12	14.56	15.69	16.58	14.93
OCEAN GOING VESSELS	0.37	0.14	0.05	0.05	0.05	0.05	0.05
COMMERCIAL HARBOR CRAFT	0.11	0.07	0.07	0.06	0.03	0.03	0.03
RECREATIONAL BOATS	3.70	3.53	3.42	3.29	3.09	2.99	2.92
OFF-ROAD RECREATIONAL VEHICLES	0.09	0.08	0.08	0.08	0.09	0.10	0.10
OFF-ROAD EQUIPMENT	24.48	24.49	24.01	21.59	14.52	11.18	9.58
OFF-ROAD EQUIPMENT (PERP)	6.83	6.32	5.87	4.28	2.55	2.16	2.10
FARM EQUIPMENT	58.91	54.44	50.45	40.97	27.35	19.64	14.27
FUEL STORAGE AND HANDLING	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*** TOTAL OTHER MOBILE SOURCES**	**107.61**	**104.47**	**99.59**	**89.50**	**67.97**	**57.31**	**48.56**
**** TOTAL MOBILE**	**251.81**	**219.48**	**197.73**	**150.78**	**95.92**	**76.88**	**64.14**

GRAND TOTAL FOR SAN JOAQUIN VALLEY	**297.32**	**254.72**	**230.04**	**181.29**	**119.50**	**97.49**	**84.13**

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CONT

Table A-2 VOC Emissions (Summer Daily Averages in Tons per Day)

VOC SUMMER AVERAGE (tons/day)							
SUMMARY CATEGORY NAME	**2013**	**2015**	**2017**	**2020**	**2026**	**2031**	**2036**
STATIONARY SOURCES							
FUEL COMBUSTION							
ELECTRIC UTILITIES	0.30	0.24	0.19	0.17	0.15	0.12	0.09
COGENERATION	0.52	0.47	0.43	0.41	0.41	0.42	0.48
OIL AND GAS PRODUCTION (COMBUSTION)	1.22	1.39	1.15	1.05	0.88	0.76	0.66
PETROLEUM REFINING (COMBUSTION)	0.10	0.03	0.04	0.04	0.04	0.04	0.04
MANUFACTURING AND INDUSTRIAL	0.30	0.28	0.23	0.24	0.19	0.19	0.20
FOOD AND AGRICULTURAL PROCESSING	1.30	1.12	0.82	0.74	0.65	0.62	0.63
SERVICE AND COMMERCIAL	0.73	0.54	0.54	0.57	0.55	0.54	0.55
OTHER (FUEL COMBUSTION)	0.07	0.05	0.05	0.04	0.04	0.04	0.04
*** TOTAL FUEL COMBUSTION**	**4.52**	**4.11**	**3.43**	**3.26**	**2.91**	**2.73**	**2.68**
WASTE DISPOSAL							
SEWAGE TREATMENT	0.03	0.04	0.05	0.05	0.05	0.05	0.06
LANDFILLS	1.54	1.56	1.51	1.55	1.61	1.70	1.77
INCINERATORS	0.02	0.01	0.01	0.01	0.01	0.01	0.01
SOIL REMEDIATION	0.16	0.08	0.09	0.09	0.10	0.10	0.10
OTHER (WASTE DISPOSAL)	21.00	21.30	21.54	22.13	23.02	24.56	26.50
*** TOTAL WASTE DISPOSAL**	**22.75**	**22.98**	**23.19**	**23.83**	**24.79**	**26.41**	**28.44**

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CONT

VOC SUMMER AVERAGE (tons/day)							
SUMMARY CATEGORY NAME	**2013**	**2015**	**2017**	**2020**	**2026**	**2031**	**2036**
CLEANING AND SURFACE COATINGS							
LAUNDERING	0.07	0.08	0.08	0.08	0.09	0.09	0.09
DEGREASING	1.60	1.82	1.79	1.79	1.95	2.08	2.27
COATINGS AND RELATED PROCESS SOLVENTS	7.55	8.45	8.84	9.64	10.14	10.63	11.66
PRINTING	4.74	5.81	5.61	5.09	5.34	5.40	5.60
ADHESIVES AND SEALANTS	0.59	0.59	0.62	0.63	0.63	0.63	0.64
OTHER (CLEANING AND SURFACE COATINGS)	5.56	6.30	7.03	7.37	8.05	8.15	8.64
*** TOTAL CLEANING AND SURFACE COATINGS**	**20.11**	**23.06**	**23.98**	**24.59**	**26.20**	**26.98**	**28.90**
PETROLEUM PRODUCTION AND MARKETING							
OIL AND GAS PRODUCTION	13.52	13.01	11.46	10.49	8.75	7.55	6.52
PETROLEUM REFINING	0.41	0.50	0.44	0.44	0.44	0.44	0.44
PETROLEUM MARKETING	5.63	5.13	5.09	4.64	4.05	3.82	3.77
OTHER (PETROLEUM PRODUCTION AND MARKETING)	0.00	0.00	0.01	0.01	0.01	0.01	0.01
*** TOTAL PETROLEUM PRODUCTION AND MARKETING**	**19.56**	**18.65**	**17.00**	**15.58**	**13.24**	**11.82**	**10.74**
INDUSTRIAL PROCESSES							
CHEMICAL	2.09	2.39	2.63	2.51	2.63	2.78	3.02
FOOD AND AGRICULTURE	11.42	12.96	12.76	12.97	13.92	15.17	16.77
MINERAL PROCESSES	0.18	0.20	0.22	0.20	0.21	0.20	0.21
METAL PROCESSES	0.17	0.15	0.17	0.18	0.20	0.21	0.23
WOOD AND PAPER	0.01	0.01	0.01	0.01	0.01	0.01	0.01
GLASS AND RELATED PRODUCTS	0.02	0.01	0.01	0.01	0.01	0.01	0.01
ELECTRONICS	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OTHER (INDUSTRIAL PROCESSES)	0.80	0.50	0.49	0.48	0.52	0.56	0.61
*** TOTAL INDUSTRIAL PROCESSES**	**14.68**	**16.22**	**16.28**	**16.37**	**17.50**	**18.94**	**20.86**
**** TOTAL STATIONARY**	**81.61**	**85.01**	**83.88**	**83.61**	**84.65**	**86.87**	**91.61**

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CONT

VOC SUMMER AVERAGE (tons/day)							
SUMMARY CATEGORY NAME	**2013**	**2015**	**2017**	**2020**	**2026**	**2031**	**2036**
AREAWIDE SOURCES							
SOLVENT EVAPORATION							
CONSUMER PRODUCTS	24.34	25.29	25.78	28.74	28.66	30.93	33.15
ARCHITECTURAL COATINGS AND RELATED PROCESS SOLVENTS	6.54	6.62	6.74	6.92	7.28	7.69	8.01
PESTICIDES/FERTILIZERS	19.56	15.41	20.81	18.86	18.71	18.46	18.23
ASPHALT PAVING / ROOFING	0.92	0.97	1.04	1.13	1.25	1.31	1.38
*** TOTAL SOLVENT EVAPORATION**	**51.35**	**48.29**	**54.37**	**55.66**	**55.90**	**58.39**	**60.76**
MISCELLANEOUS PROCESSES							
RESIDENTIAL FUEL COMBUSTION	0.48	0.40	0.42	0.41	0.41	0.41	0.41
FARMING OPERATIONS	93.99	93.86	93.76	93.63	93.45	93.37	93.32
CONSTRUCTION AND DEMOLITION	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PAVED ROAD DUST	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UNPAVED ROAD DUST	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FUGITIVE WINDBLOWN DUST	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FIRES	0.13	0.13	0.13	0.14	0.14	0.15	0.16
MANAGED BURNING AND DISPOSAL	1.06	14.31	16.38	7.46	14.84	14.83	14.83
COOKING	0.59	0.59	0.61	0.62	0.65	0.68	0.71
OTHER (MISCELLANEOUS PROCESSES)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*** TOTAL MISCELLANEOUS PROCESSES**	**96.24**	**109.30**	**111.30**	**102.25**	**109.50**	**109.45**	**109.43**
**** TOTAL AREAWIDE**	**147.59**	**157.59**	**165.67**	**157.91**	**165.40**	**167.84**	**170.19**
MOBILE SOURCES							
ON-ROAD MOTOR VEHICLES							
LIGHT DUTY PASSENGER (LDA)	15.22	13.14	10.82	8.61	6.20	4.86	3.82
LIGHT DUTY TRUCKS - 1 (LDT1)	4.03	3.37	2.89	2.50	1.35	0.84	0.56
LIGHT DUTY TRUCKS - 2 (LDT2)	6.45	5.99	5.26	4.00	3.26	2.70	2.28

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VOC SUMMER AVERAGE (tons/day)							
SUMMARY CATEGORY NAME	**2013**	**2015**	**2017**	**2020**	**2026**	**2031**	**2036**
MEDIUM DUTY TRUCKS (MDV)	6.91	6.65	6.42	5.49	3.92	2.91	2.32
LIGHT HEAVY DUTY TRUCKS - 1 (LHDT1)	1.85	1.88	1.75	1.45	1.05	0.70	0.50
LIGHT HEAVY DUTY TRUCKS - 2 (LHDT2)	0.32	0.31	0.32	0.27	0.22	0.16	0.12
MEDIUM HEAVY DUTY TRUCKS (MHDT)	1.11	0.90	0.77	0.34	0.11	0.07	0.05
HEAVY HEAVY DUTY TRUCKS (HHDT)	5.63	3.03	2.19	1.10	0.64	0.66	0.71
MOTORCYCLES (MCY)	2.79	2.73	2.55	2.27	2.09	1.90	1.80
BUSES	0.16	0.17	0.14	0.08	0.05	0.05	0.04
MOTOR HOMES (MH)	0.22	0.18	0.16	0.11	0.06	0.04	0.02
*** TOTAL ON-ROAD MOTOR VEHICLES**	**44.68**	**38.36**	**33.27**	**26.21**	**18.95**	**14.88**	**12.22**
OTHER MOBILE SOURCES							
AIRCRAFT	3.00	3.01	3.01	3.89	3.91	3.91	3.92
TRAINS	0.58	0.64	0.61	0.65	0.65	0.67	0.57
OCEAN GOING VESSELS	0.02	0.01	0.00	0.00	0.00	0.00	0.00
COMMERCIAL HARBOR CRAFT	0.01	0.00	0.00	0.00	0.00	0.00	0.00
RECREATIONAL BOATS	24.67	22.37	20.37	17.72	13.65	11.19	9.32
OFF-ROAD RECREATIONAL VEHICLES	2.80	2.51	2.35	2.19	1.80	1.33	1.03
OFF-ROAD EQUIPMENT	16.87	15.66	14.95	14.56	11.70	7.85	5.88
OFF-ROAD EQUIPMENT (PERP)	0.53	0.51	0.49	0.39	0.30	0.30	0.32
FARM EQUIPMENT	11.15	10.00	9.03	7.79	5.60	4.28	3.35
FUEL STORAGE AND HANDLING	2.67	2.45	2.29	2.11	1.90	1.85	1.91
*** TOTAL OTHER MOBILE SOURCES**	**62.30**	**57.17**	**53.10**	**49.32**	**39.51**	**31.38**	**26.32**
**** TOTAL MOBILE**	**106.97**	**95.52**	**86.38**	**75.53**	**58.46**	**46.26**	**38.54**

GRAND TOTAL FOR SAN JOAQUIN VALLEY	**336.18**	**338.13**	**335.92**	**317.05**	**308.50**	**300.97**	**300.33**

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Appendix B

Analysis of Meteorology Affecting Ozone Levels

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APPENDIX B: ANALYSIS OF METEOROLOGY AFFECTING OZONE LEVELS

Introduction

The San Joaquin Valley Air Pollution Control District (District) has been in attainment of the 1-hour ozone standard for a decade, and though meteorology is not the driving force behind the attainment of the 1-hour ozone standard, it can have a significant influence on ozone concentrations. This appendix presents a summary of temperature and rainfall totals analyses that support the influence of meteorological conditions on ozone formation and concentrations.

Ambient Air Temperature

High temperatures can intensify and increase ozone formation, and as such ozone concentrations typically become elevated during the summer months. The Valley experiences very hot summers with an average of 36 days over 100°F, and months that typically have maximum temperatures over 100°F are highlighted yellow in the tables below. The Modesto, Fresno, and Bakersfield monthly temperature data shown in Table B-1, Table B-2, and Table B-3 provides the comparison of maximum temperatures recorded for the period 2000-2022. Table B-1, Table B-2, and Figure B-3 show the correlation between maximum temperatures and 1-hour maximum ozone concentrations during the summer season. Surface ozone is driven by the photochemical reactions between volatile organic compounds and nitrogen oxides in the presence of sunlight. In general, surface ozone is linearly and positively correlated with temperature depending on emissions and meteorological conditions.

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Table B-1 Modesto, CA temperature data for the period 2000-2022 (°F)[1]

Month	Maximum Monthly Temperature					
	2000 - 2010	2010 - 2018	2019	2020	2021	2022
January	70	73	66	67	74	66
February	76	77	67	80	73	76
March	87	87	78	79	81	85
April	99	93	94	91	89	92
May	107	101	89	104	100	100
June	111	109	106	103	107	101
July	113	108	105	104	108	103
August	107	109	104	111	101	103
September	105	108	100	107	101	112
October	99	99	90	97	90	93
November	82	82	79	81	72	67
December	70	71	68	71	73	60

[1] Source: Western Region Climate Data Center https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5738

Table B-2 Fresno, CA temperature data for the period 2000 - 2022 (°F)[2]

Month	Maximum Monthly Temperature					
	2000 - 2010	2010 - 2018	2019	2020	2021	2022
January	70	78	67	67	70	67
February	77	80	69	83	73	82
March	87	91	83	82	84	90
April	98	96	96	91	95	96
May	106	102	90	106	101	103
June	110	110	106	107	111	107
July	113	109	107	108	114	110
August	110	111	108	112	107	107
September	106	109	104	106	107	114
October	99	101	91	96	93	95
November	90	90	81	82	75	71
December	77	73	68	69	73	-----

Table B-3 Bakersfield, CA temperature data for the period 2000 - 2022 (°F)[3]

Month	Maximum Monthly Temperature					
	2000 - 2010	2010 - 2018	2019	2020	2021	2022
January	75	82	72	66	71	70
February	85	85	73	83	75	85
March	94	93	82	85	88	91
April	99	98	96	92	94	97
May	107	104	91	105	102	102
June	110	110	108	105	110	105
July	112	111	110	108	111	110
August	111	112	108	107	106	108
September	105	111	102	105	108	115
October	98	100	91	97	94	95
November	94	94	82	87	75	79
December	81	75	74	74	77	-----

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CONT

[2] Source: Western Region Climate Data Center https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca3257
[3] Source: Western Region Climate Data Center https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca0442

Figure B-1 Turlock 1-hour Ozone Max Concentrations and Modesto City Airport Temperatures

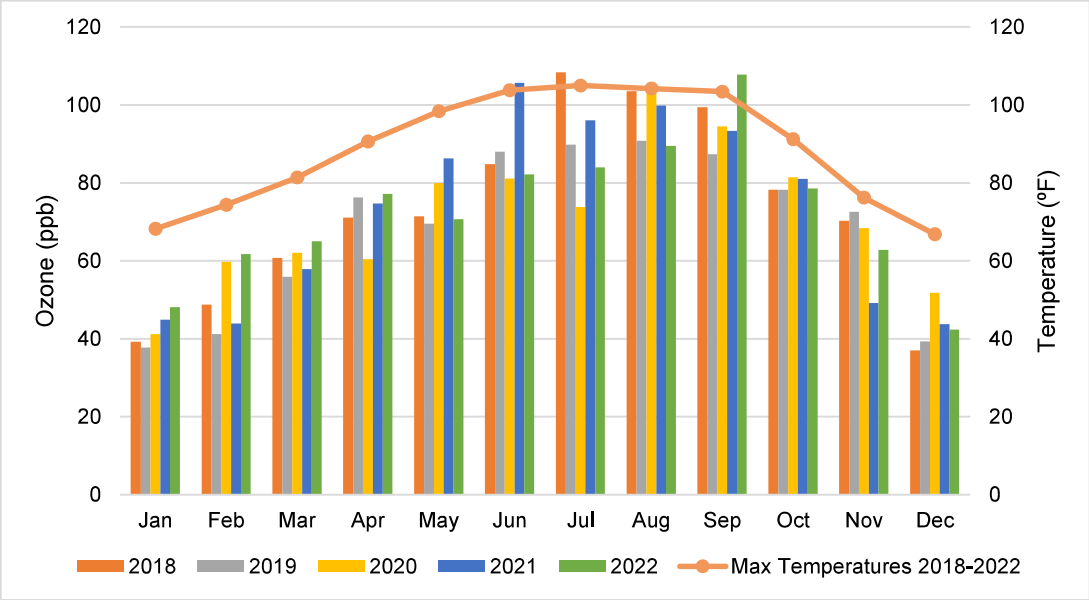

Figure B-2 Fresno-Garland 1-hour Ozone Max Concentrations and Fresno Air Terminal Temperatures

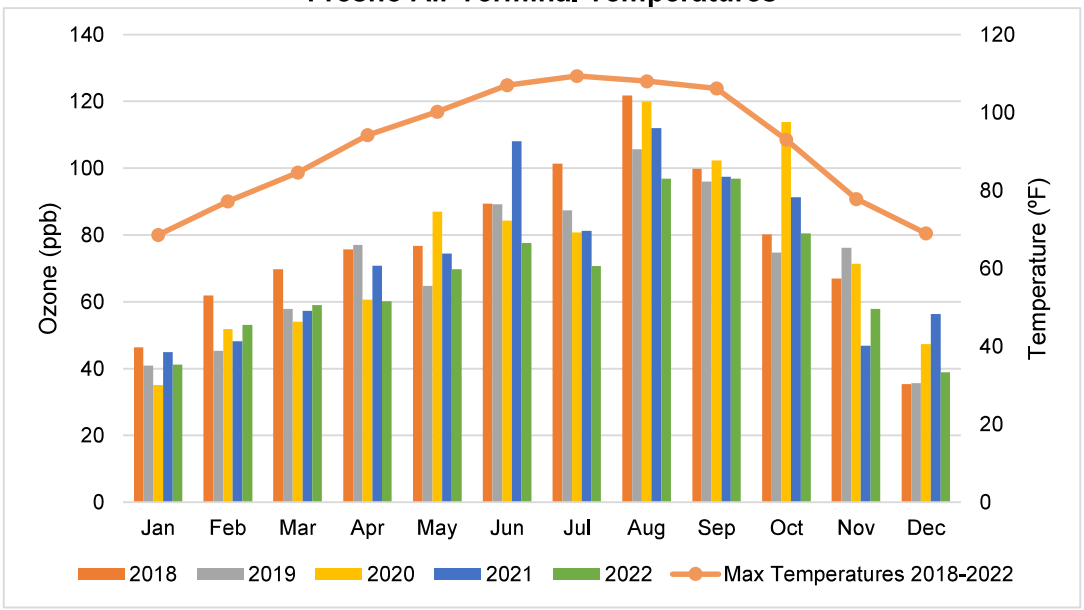

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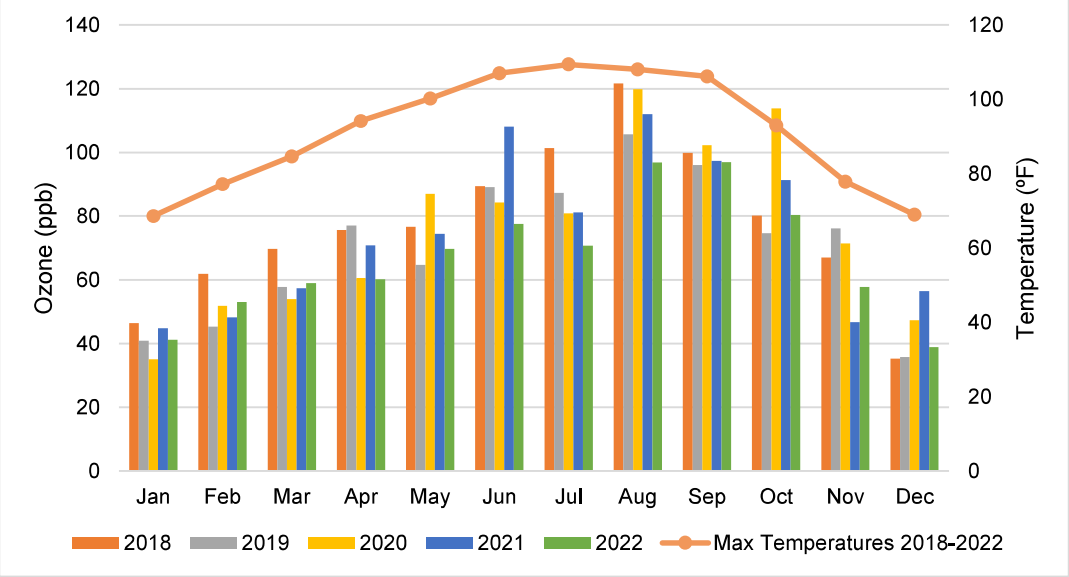
Figure B-3 Edison 1-hour Ozone Max Concentrations and Bakersfield Meadows Airport Temperatures



Distribution of High Temperature Days

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Figure B-4 through Figure B-6 illustrate that the 2012-2019 and 2020-2022 average daily maximum temperatures at the Stockton Airport, Fresno Yosemite International (FYI) Airport, and Bakersfield Meadows (BM) Airport are close to the 62-year average (1950-2011). The daily maximum temperatures in Stockton, Fresno, and Bakersfield have all either slightly increased over time, or remained consistent, thus providing evidence that the 2020-2022 years were not unusually conducive to lower ozone concentrations and that the District maintained the 1-hour ozone standard without the influence of improved meteorology.

Figure B-4 Ozone Season Average Range of Daily Maximum Temperatures – Stockton Airport, Averaged May-October (2012-2022)

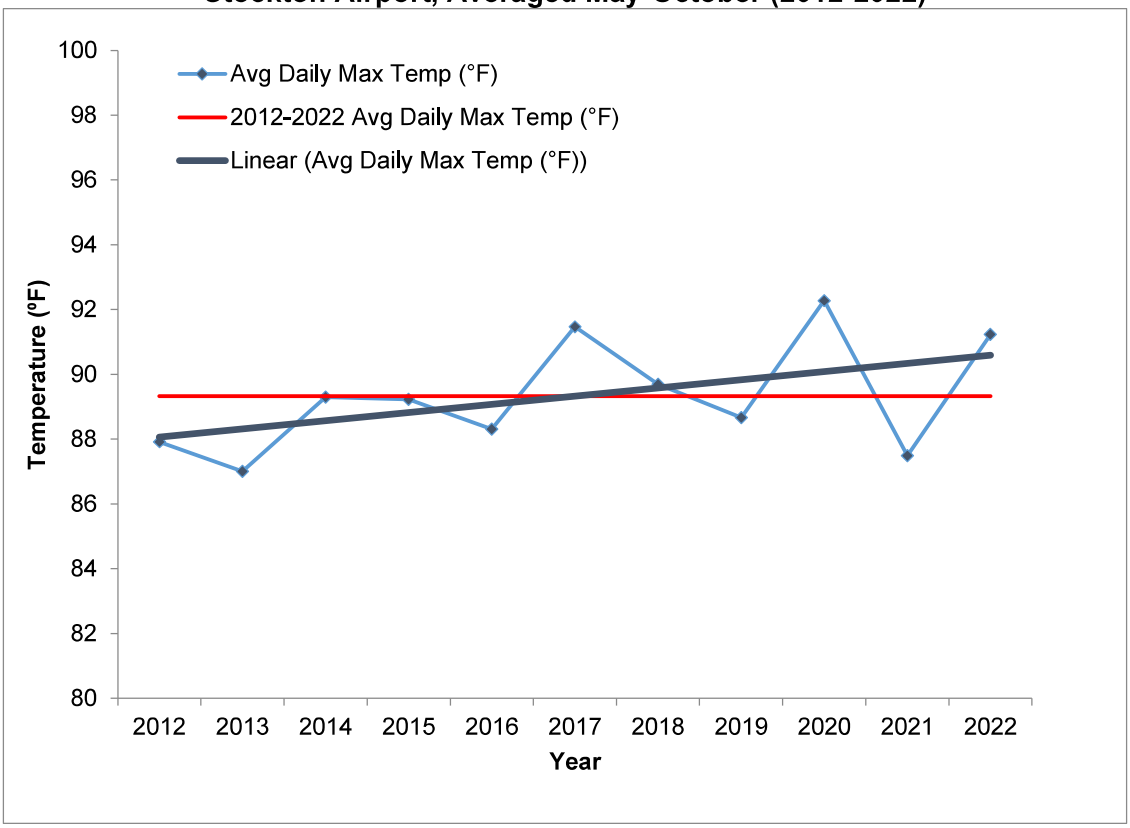

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Figure B-5 Ozone Season Average Range of Daily Maximum Temperatures – Fresno Yosemite International Airport, Averaged May-October (2012-2022)

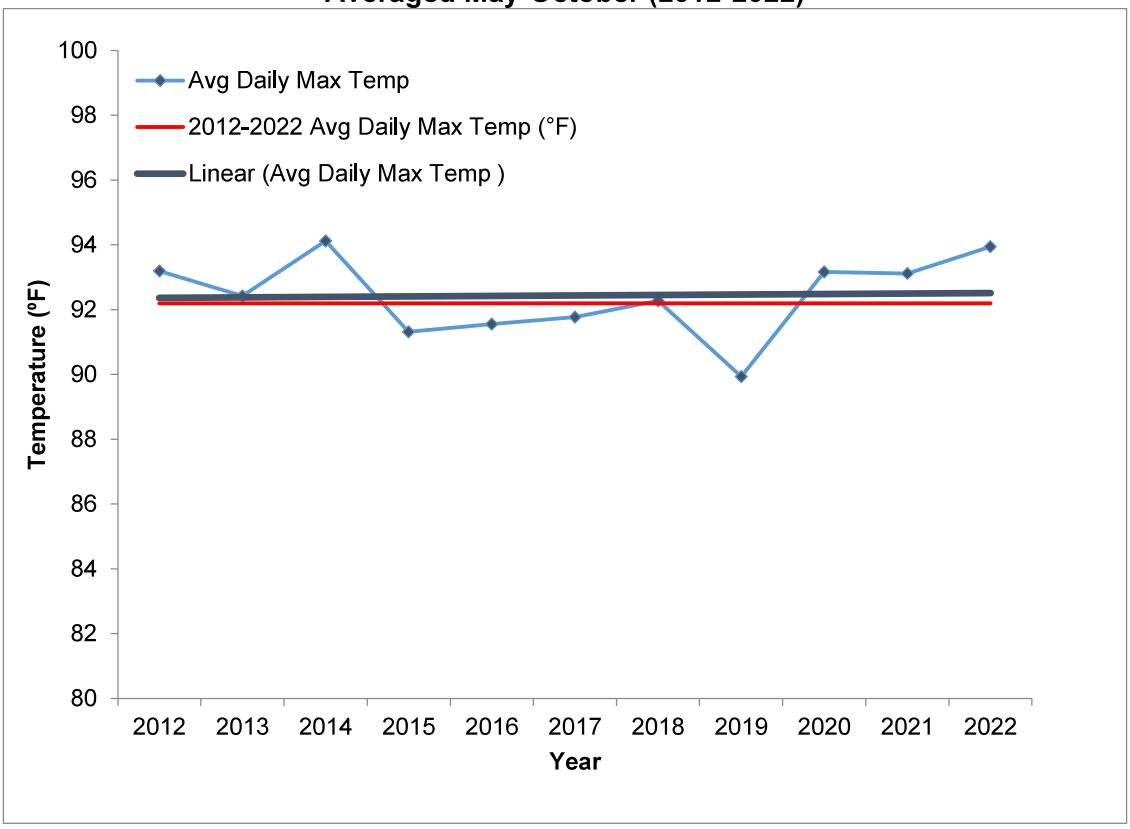

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Figure B-6 Ozone Season Average Range of Daily Maximum Temperatures – Bakersfield Meadows Airport, Averaged May-October (2012-2022)

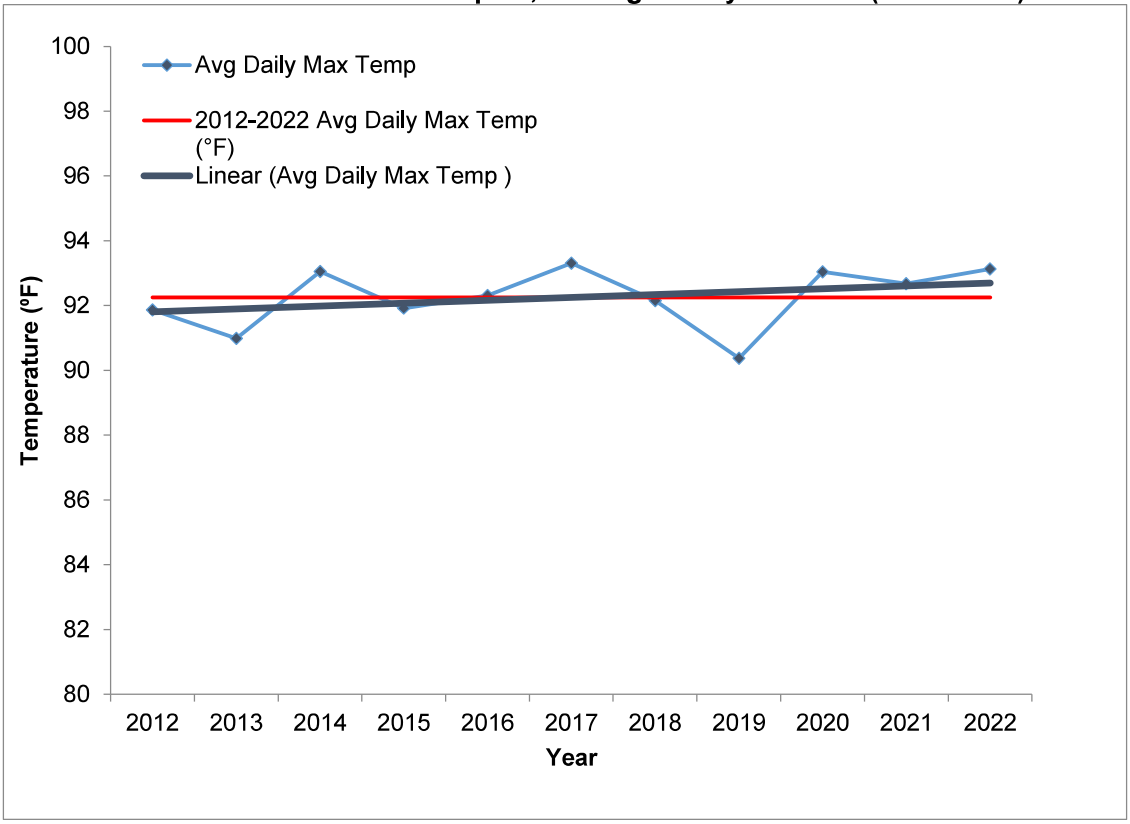

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Figure B-7 through Figure B-9 compare the annual number of days with high temperatures (≥95˚F) at the Stockton, FYI, and the BM Airports to the annual number of days exceeding the 1-hour ozone standard locally (County) for 2012 to 2022.

Figure B-7 Number of Days per Year with High Temperatures ≥ 95ºF at Stockton Airport (May-October) and Days Exceeding the 1-hour Ozone NAAQS (2012-2022)

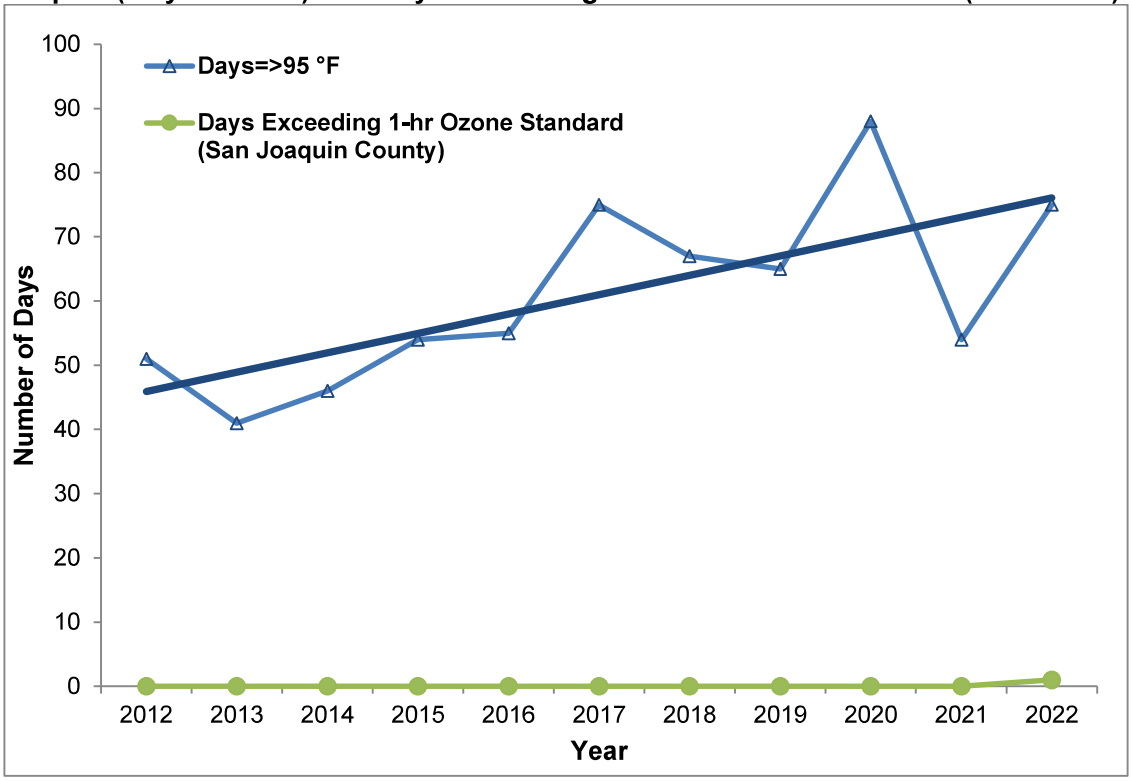

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Figure B-8 Number of Days per Year with High Temperatures ≥ 95ºF at Fresno Yosemite International Airport (May-October) and Days Exceeding the 1-hour Ozone NAAQS (2012-2022)

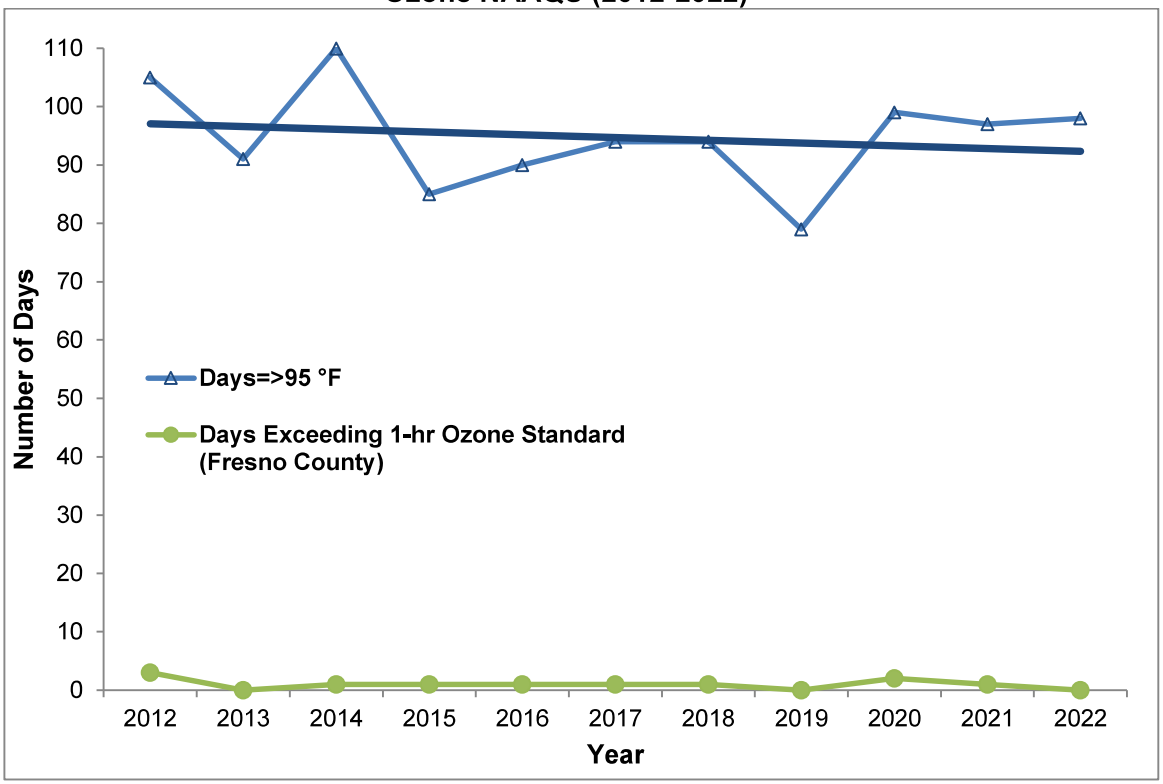

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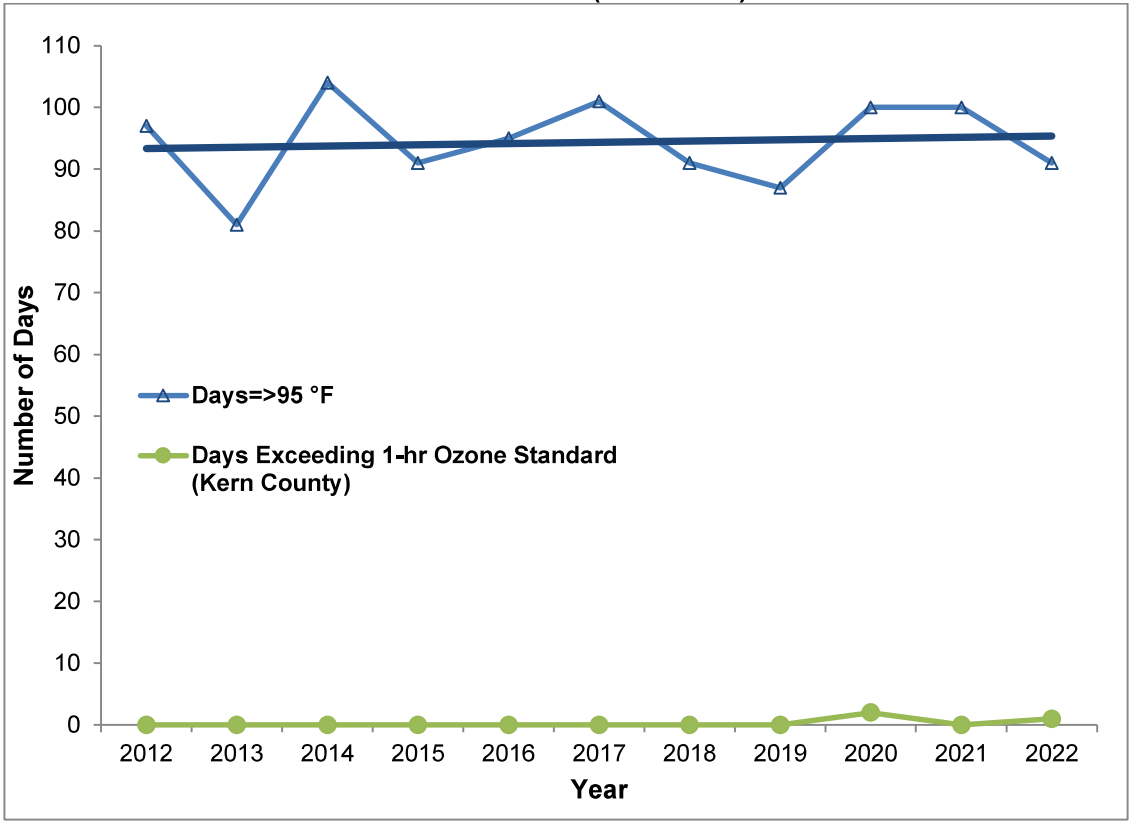
Figure B-9 Number of Days per Year with High Temperatures ≥ 95ºF at Bakersfield Meadows Airport (May-October) and Days Exceeding the 1-hour Ozone NAAQS (2012-2022)



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Drought in the San Joaquin Valley

As described in Section 4, the San Joaquin Valley was declared in a State of Emergency due to severe drought conditions in 2021. The District is located in an arid climate with hot, dry summers, and cool, wet winters. Sunlight is necessary in order to form ozone and increased cloud cover can deter the ozone life cycle. Additionally, precipitation generally accompanies dispersive low pressure systems that move through the region and reduce ozone concentrations. During the winter and early spring the Valley tends to receive the most precipitation, with the highest rainfall in January, March, and December. Likewise the lowest ozone concentrations are typically measured during these periods, due to increased dispersion and cloud cover.

Drought conditions are often coupled with warmer temperatures, and longer periods of poor dispersion. Periods with minimal precipitation can be correlated with poor dispersion and increased ozone concentrations. Months with minimal to no precipitation are highlighted yellow in Table B-4, Table B-5, and Table B-6 below. High pressure systems and drought conditions tend to dominate during the summer season with hot

temperatures and stagnation. The lack of dispersion coupled with the dry conditions easily exacerbates ozone formation and contributes to elevated ozone concentrations throughout the summer months, as shown in Figure B-10, Figure B-11, and Figure B-12.

Even with the described drought conditions, which could cause for elevated ozone concentrations, the District has maintained the 1-hour ozone standard for nearly a decade. This provides further assurance that unusually favorable meteorology did not cause for the attainment nor maintenance of the 1-hour ozone standard.

Table B-4 Modesto, CA monthly precipitation for the period 2000-2022[4]

Month	Monthly Precipitation (Inches)					
	2000 - 2010	2010 - 2018	2019	2020	2021	2022
January	2.4	2.3	2.0	0.7	3.9	0.0
February	2.2	1.6	2.9	0.0	0.9	0.0
March	1.3	1.9	2.6	1.9	0.7	0.6
April	1.2	1.3	0.2	1.0	0.0	0.2
May	0.5	0.3	1.3	0.0	0.0	0.0
June	0.1	0.2	0.0	0.1	0.0	0.0
July	0.0	0.0	0.0	0.0	0.0	0.0
August	0.0	0.0	0.0	0.0	0.0	0.0
September	0.1	0.0	0.1	0.0	0.0	0.1
October	0.6	0.5	0.0	0.0	2.8	0.0
November	0.9	1.5	0.2	0.1	0.3	1.2
December	2.6	2.2	2.6	1.4	5.1	6.9

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Table B-5 Fresno, CA monthly precipitation for the period 2000-2022[5]

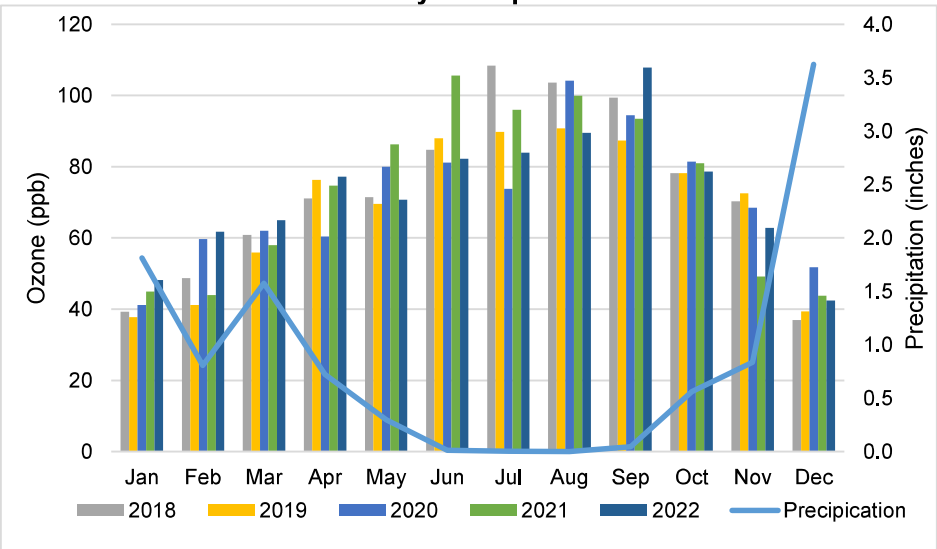
Month	Monthly Precipitation (Inches)					
	2000 - 2010	2010 - 2018	2019	2020	2021	2022
January	1.9	2.0	2.2	0.7	3.4	0.0
February	2.2	1.4	3.3	0.0	0.3	0.0
March	1.4	1.8	1.3	2.3	1.3	0.7
April	1.2	1.3	0.4	1.7	0.2	0.3
May	0.4	0.2	2.4	0.1	0.0	0.0
June	0.1	0.2	0.0	0.0	0.0	0.0
July	0.0	0.0	0.0	0.0	0.0	0.0
August	0.0	0.0	0.0	0.0	0.0	0.1
September	0.0	0.1	0.0	0.0	0.0	0.1
October	0.7	0.4	0.0	0.0	1.3	0.0
November	0.8	1.1	0.7	0.3	0.3	0.7
December	2.3	1.8	2.2	1.1	3.6	-----

[4] Source: Western Region Climate Center https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5738
[5] Source: Western Region Climate Center https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca3257

Table B-6 Bakersfield, CA monthly precipitation for the period 2000-2022[6]

Month	Monthly Precipitation (Inches)					
	2000 - 2010	2010 - 2018	2019	2020	2021	2022
January	1.1	2.3	2.0	0.7	3.9	0.0
February	1.4	1.6	2.9	0.0	0.9	0.0
March	0.8	1.9	2.6	1.9	0.7	0.6
April	0.8	1.3	0.2	1.0	0.0	0.2
May	0.2	0.3	1.3	0.0	0.0	0.0
June	0.0	0.2	0.0	0.1	0.0	0.0
July	0.0	0.0	0.0	0.0	0.0	0.0
August	0.0	0.0	0.0	0.0	0.0	0.0
September	0.0	0.0	0.1	0.0	0.0	0.1
October	0.4	0.5	0.0	0.0	2.8	0.0
November	0.6	1.5	0.2	0.1	0.3	1.2
December	1.1	2.2	2.6	1.4	5.1	6.9

Figure B-10 Turlock 1-hour Ozone Max Concentrations and Modesto City Airport Monthly Precipitation



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[6] Source: Western Region Climate Center https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca0442

Figure B-11 Fresno-Garland 1-hour Ozone Max Concentrations and Fresno Air Terminal Airport Monthly Precipitation

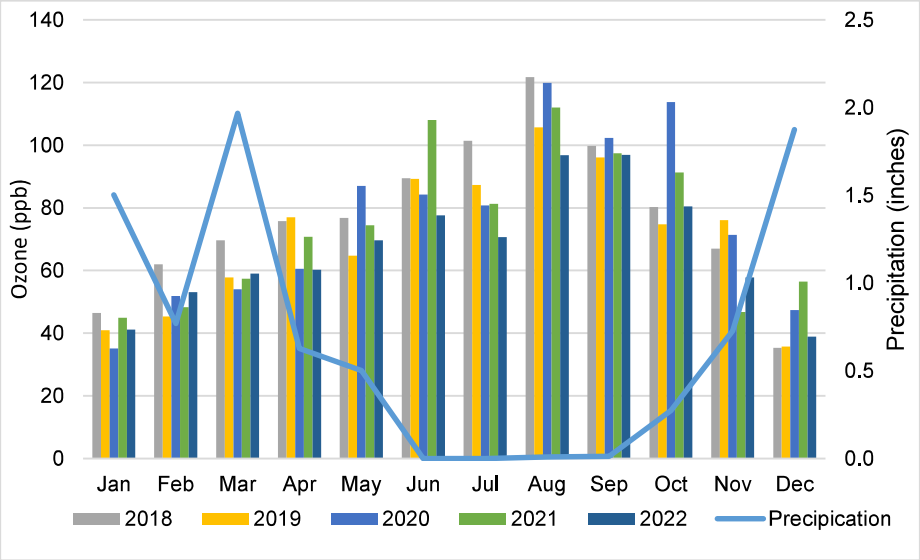
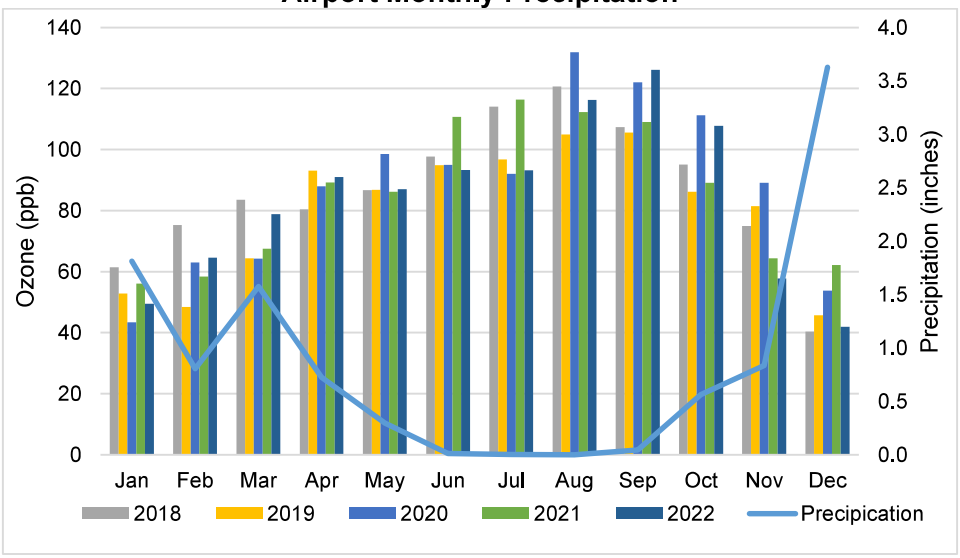


Figure B-12 Edison 1-hour Ozone Max Concentrations and Bakersfield Meadows Airport Monthly Precipitation



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Fresno County 2023-2060 Growth Projections

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Prepared by:

Fresno Council of Governments
Applied Development Economics, Inc

October 17, 2024

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EXECUTIVE SUMMARY

INTRODUCTION

This report updates the growth projections for Fresno County and the spheres of influence of each of its cities previously published in 2020. The new projections utilize a base year of 2022. This report developed by the Fresno Council of Governments (FCOG) is to assist with updating the Regional Transportation Plan (RTP) as well as the Sustainable Communities Strategies (SCS).

Applied Development Economics, Inc collaborated with Fresno COG staff to revise the county's projections to the 2022 to 2060 timeframe, using latest population estimation and projection from California Department of Finance(DOF), detailed demographics data from 2020 Census, and vital statistics in last decade.

In September 2024, the DOF Demographic Research Unit released the Population Projections, 2020-2070, indicating slower growth compared to earlier projections. The 2023 Baseline release (2024.09.23) suggests that Fresno County's population will be 7% lower in 2035 and 9% lower in 2050 than projected in 2019. FCOG staff has revised the county-level population projection to align with DOF's most recent release.

The updated projection anticipate a population increase of 117,980 in Fresno County from 2022 to 2060, with the total population peaking at 1,131,120 in 2055 before declining to 1,128,530 by 2060.

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Regarding job growth, the updated forecast predicts the addition of 77,170 wage and salary jobs in the county between 2022 and 2060, translating to an average annual growth of approximately 2,030 jobs over the 38-year period.

In addition to the population and employment projections, the report includes projections of demographic characteristics and housing demand, including the following:

- Households
- Average Household Size
- Group Quarters Population
- Average Income
- Housing
- House Unit Type
- Age Distribution
- Race/Ethnicity
- School Enrollment

Table 1 – Population and Employment Projections by Jurisdiction Sphere of Influence

Jurisdiction	2022	2025	2030	2035	2040	2045	2050	2055	2060
Total Population									
County Total	1,010,550	1,017,950	1,041,670	1,066,610	1,090,820	1,111,570	1,125,490	1,131,120	1,128,530
Clovis SOI	126,960	129,050	136,500	142,490	148,310	153,300	156,650	158,000	157,380
Coalinga SOI	17,290	17,300	17,530	17,770	17,990	18,190	18,320	18,370	18,350
Firebaugh SOI	8,420	8,410	8,670	8,830	8,990	9,120	9,210	9,250	9,230
Fowler SOI	7,310	7,660	8,240	8,910	9,550	10,110	10,480	10,630	10,560
Fresno SOI (incl. county islands)	592,280	595,370	605,800	617,840	629,520	639,540	646,260	648,980	647,730
Huron SOI	6,170	6,230	6,260	6,390	6,520	6,630	6,710	6,740	6,720
Kerman SOI	16,830	17,360	18,510	19,650	20,750	21,700	22,340	22,600	22,480
Kingsburg SOI	12,750	13,210	13,750	14,550	15,340	16,010	16,460	16,650	16,560
Mendota SOI	12,500	12,530	13,070	13,400	13,710	13,980	14,170	14,240	14,210
Orange Cove SOI	9,590	9,600	9,670	9,780	9,890	9,990	10,050	10,070	10,060
Parlier SOI	15,030	15,040	15,060	15,200	15,340	15,450	15,530	15,560	15,550
Reedley SOI	25,290	25,830	25,900	26,740	27,550	28,250	28,710	28,900	28,820
Sanger SOI	27,040	27,040	27,540	27,940	28,330	28,670	28,900	28,990	28,940
San Joaquin SOI	3,670	3,610	3,640	3,670	3,700	3,720	3,740	3,750	3,740
Selma SOI	26,540	26,650	28,250	29,150	30,030	30,790	31,290	31,490	31,400
Unincorporated Areas (excl. SOIs)	102,880	103,050	103,280	104,290	105,280	106,120	106,680	106,910	106,800
Total Jobs									
County Total	414,750	421,140	432,740	442,600	454,800	466,150	476,330	484,780	491,920
Clovis SOI	40,550	41,260	43,220	44,860	46,580	48,130	49,430	50,390	51,050
Coalinga SOI	5,010	5,020	5,100	5,170	5,250	5,320	5,380	5,420	5,460
Firebaugh SOI	2,230	2,160	2,320	2,450	2,590	2,720	2,840	2,950	3,050
Fowler SOI	3,990	4,190	4,390	4,680	5,000	5,290	5,590	5,810	6,010
Fresno SOI (incl. county islands)	260,210	260,420	265,950	271,760	277,970	283,670	288,820	293,150	296,870
Huron SOI	1,080	1,140	1,170	1,230	1,280	1,340	1,390	1,430	1,460
Kerman SOI	4,320	4,560	4,860	5,160	5,470	5,760	5,990	6,170	6,280
Kingsburg SOI	5,240	5,320	5,580	5,880	6,210	6,500	6,760	6,970	7,140
Mendota SOI	1,830	1,820	1,960	2,060	2,160	2,250	2,330	2,390	2,430
Orange Cove SOI	960	970	990	1,020	1,050	1,080	1,100	1,120	1,130
Parlier SOI	2,550	2,540	2,610	2,700	2,790	2,880	2,970	3,040	3,100
Reedley SOI	8,120	8,400	8,520	8,800	9,100	9,370	9,610	9,800	9,940
Sanger SOI	9,800	9,720	10,050	10,340	10,660	10,960	11,240	11,480	11,700
San Joaquin SOI	650	630	640	650	660	670	680	690	690
Selma SOI	9,280	11,510	12,490	11,320	11,670	12,000	12,290	12,520	12,710
Unincorporated Areas (excl. SOIs)	58,920	61,480	62,890	64,580	66,360	68,210	69,910	71,450	72,900

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CONT

2060 GROWTH PROJECTIONS

INTRODUCTION

This report presents updated projections for employment, population, housing and demographic characteristics for the Fresno County region. The current projections update the base year to 2022 and extend the projections to 2060. And the age group, sex, race, and ethnicity data for each jurisdiction have been updated based on the 2020 Census. The study process included outreach to the jurisdictions in the county to review local planning policies and development trends.

COMPARISON TO PRIOR PROJECTIONS

The updated projection indicates slower population growth, primarily due to revised vital statistics showing that the birth rate has been steadily declining since the early 2000s. Compared to the projection used in 2022 RTP, the updated forecast projects that Fresno County would have 7% less population in 2035, 9% less population in 2050, and 53% less population growth from 2020 to 2035, 45% less population growth from 2020 to 2050.

Figure below shows the population estimations since year 2000, and comparison to prior projections applied in Fresno COG' 2018 and 2022 RTPs, which aligned with historical DOF projections.

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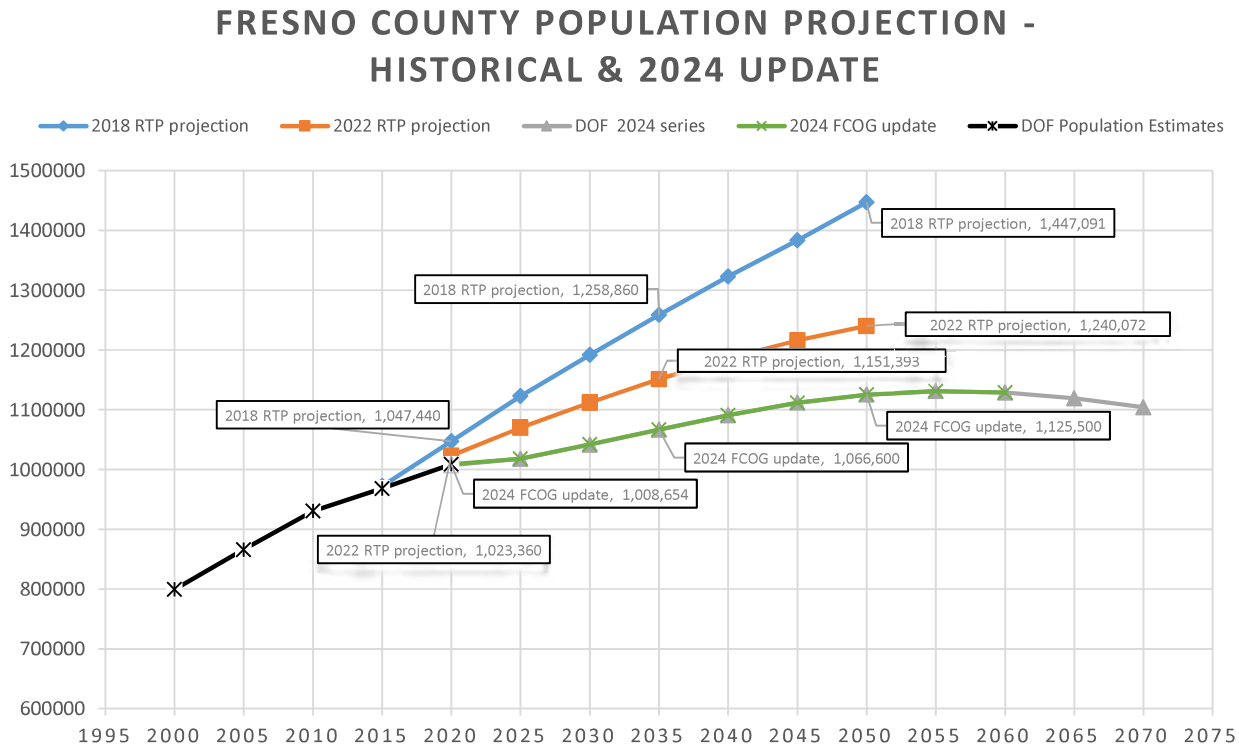

2060 GROWTH PROJECTIONS

POPULATION

Fresno County is projected to gain nearly 118,000 residents by 2060. The City of Fresno would experience the largest increase of 55,450 people, followed by Clovis with 30,420. In terms of growth rates, Fowler and Kerman are projected to see faster growth compared to other areas.

Table 2 – Total Population Projections by Jurisdiction, 2022-2060

Jurisdiction	2022	2025	2030	2035	2040	2045	2050	2055	2060	2022-2060 change	2022-2060 annual growth rate
Fresno County	1,010,550	1,017,950	1,041,670	1,066,610	1,090,820	1,111,570	1,125,490	1,131,120	1,128,530	117,980	0.3%
Clovis and SOI	126,960	129,050	136,500	142,490	148,310	153,300	156,650	158,000	157,380	30,420	0.6%
Coalinga and SOI	17,290	17,300	17,530	17,770	17,990	18,190	18,320	18,370	18,350	1,050	0.2%
Firebaugh and SOI	8,420	8,410	8,670	8,830	8,990	9,120	9,210	9,250	9,230	810	0.2%
Fowler and SOI	7,310	7,660	8,240	8,910	9,550	10,110	10,480	10,630	10,560	3,250	1.0%
Fresno and SOI (incl. county islands)	592,280	595,370	605,800	617,840	629,520	639,540	646,260	648,980	647,730	55,450	0.2%
Huron and SOI	6,170	6,230	6,260	6,390	6,520	6,630	6,710	6,740	6,720	560	0.2%
Kerman and SOI	16,830	17,360	18,510	19,650	20,750	21,700	22,340	22,600	22,480	5,650	0.8%
Kingsburg and SOI	12,750	13,210	13,750	14,550	15,340	16,010	16,460	16,650	16,560	3,810	0.7%
Mendota and SOI	12,500	12,530	13,070	13,400	13,710	13,980	14,170	14,240	14,210	1,710	0.3%
Orange Cove and SOI	9,590	9,600	9,670	9,780	9,890	9,990	10,050	10,070	10,060	470	0.1%
Parlier and SOI	15,030	15,040	15,060	15,200	15,340	15,450	15,530	15,560	15,550	520	0.1%
Reedley and SOI	25,290	25,830	25,900	26,740	27,550	28,250	28,710	28,900	28,820	3,520	0.3%
Sanger and SOI	27,040	27,040	27,540	27,940	28,330	28,670	28,900	28,990	28,940	1,910	0.2%
San Joaquin and SOI	3,670	3,610	3,640	3,670	3,700	3,720	3,740	3,750	3740	80	0.0%
Selma and SOI	26,540	26,650	28,250	29,150	30,030	30,790	31,290	31,490	31,400	4,860	0.4%
Unincorporated Areas (excl. SOIs)	102,880	103,050	103,280	104,290	105,280	106,120	106,680	106,910	106,800	3,920	0.1%

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HOUSEHOLDS

As of 2022, there are 991,830 individuals living in households and 18,720 in group quarters, which include correctional facilities, dormitories, and nursing facilities. Fresno County had approximately 327,030 households in 2022, with an average household size of 3.03 people. The number of households in the county is expected to increase by 42,790, reaching a total of 369,820 by 2060. The average household size is projected to remain around 3.00.

Table 3 – Projections of Household and Group Quarters Populations

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	1,010,550	991,830	18,720	327,030	3.03
2025	1,017,950	999,150	18,800	331,990	3.01
2030	1,041,670	1,022,250	19,420	343,200	2.98
2035	1,066,610	1,047,050	19,560	351,590	2.98
2040	1,090,820	1,071,120	19,700	357,300	2.99
2045	1,111,570	1,091,630	19,940	362,970	3.00
2050	1,125,490	1,105,380	20,110	367,580	3.00
2055	1,131,120	1,110,930	20,190	370,670	2.99
2060	1,128,530	1,108,390	20,140	369,820	2.99
2022-2060 change	117,980	116,560	1,420	42,790	
2022-2060 annual growth rate	0.3%	0.3%	0.2%	0.30%	

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CONT

Table 4 – Household Projections by Jurisdiction, 2022 - 2060

Jurisdiction	2022	2025	2030	2035	2040	2045	2050	2055	2060	2022-2060 change
Fresno County	327,027	331,896	343,198	351,580	357,305	362,973	367,576	370,674	369,819	42,792
Clovis and SOI	45,318	46,841	49,705	51,888	53,645	55,264	56,470	57,149	56,924	11,607
Coalinga and SOI	4,304	4,372	4,517	4,660	4,760	4,812	4,859	4,890	4,883	579
Firebaugh and SOI	2,238	2,280	2,358	2,401	2,427	2,455	2,479	2,497	2,492	255
Fowler and SOI	2,271	2,421	2,614	2,825	3,009	3,173	3,289	3,348	3,326	1,055
Fresno and SOI (incl. county islands)	195,577	197,366	203,870	207,914	210,426	213,059	215,297	216,928	216,511	20,934
Huron and SOI	1,588	1,635	1,647	1,682	1,705	1,728	1,747	1,761	1,757	169
Kerman and SOI	4,705	4,947	5,293	5,619	5,896	6,145	6,325	6,420	6,386	1,681
Kingsburg and SOI	4,441	4,692	4,899	5,187	5,430	5,650	5,809	5,893	5,863	1,422
Mendota and SOI	2,851	2,909	3,045	3,121	3,173	3,225	3,267	3,295	3,288	437
Orange Cove and SOI	2,439	2,480	2,506	2,535	2,546	2,562	2,578	2,593	2,590	151
Parlier and SOI	3,768	3,825	3,844	3,879	3,888	3,904	3,924	3,945	3,941	173
Reedley and SOI	7,244	7,506	7,549	7,793	7,976	8,150	8,285	8,368	8,343	1,099
Sanger and SOI	7,815	7,962	8,133	8,252	8,312	8,382	8,448	8,503	8,491	676
San Joaquin and SOI	902	913	922	929	930	934	938	943	942	39
Selma and SOI	7,614	7,809	8,303	8,569	8,768	8,958	9,104	9,195	9,167	1,553
Unincorporated Areas (excl. SOIs)	33,951	33,938	33,992	34,324	34,414	34,573	34,756	34,947	34,913	962

HOUSING UNITS

Considering population projections, household projections, vacant stock, and other factors such as healthy vacancy rates, overcrowding levels and residential replacement units, we anticipate a demand for 69,470 new residential units from 2022 to 2060. Based on statistics of new units constructed in the last decade, building permit information from the past 5 years , and the general plans of each city in Fresno County, we estimate that 49,900 (72 percent) will be single-family units, while the remaining 19,560 units (28 percent) will be multi-family dwellings.

Table 5 – Projected Market Demand for New Housing Units by Unit Building Type, 2022-2060

Jurisdiction	New Units Demand 2022-2060	Single-family Housing Units	Multi-family Housing Units
County Total	69,470	49,900	19,560
Clovis SOI	12,700	10,740	1,960
Coalinga SOI	930	480	450
Firebaugh SOI	570	400	170
Fowler SOI	1,180	920	270
Fresno SOI (incl. county islands)	37,600	24,070	13,530
Huron SOI	620	240	390
Kerman SOI	2,620	2,330	290
Kingsburg SOI	1,630	1,200	440
Mendota SOI	1,350	1,190	160
Orange Cove SOI	580	330	240
Parlier SOI	650	500	150
Reedley SOI	1,990	1,250	740
Sanger SOI	1,620	1,140	480
San Joaquin SOI	220	210	10
Selma SOI	2,360	2,240	120
Unincorporated Areas (excl. SOIs)	2,850	2,690	160

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AGE GROUP

As shown in the table below, while the overall population is projected to grow at an annual rate of 0.29 percent between 2022 and 2060, older age cohorts aged 45 and above are projected to grow at a faster rate. Specifically, the number of individuals aged 65 to 74 is anticipated to increase by 0.8 percent each year, while those aged 75 and older are projected to grow by 1.8 percent annually. By 2060, individuals aged 65 and over will make up 20.0 percent of the total population, compared to their current share of 13.9 percent. In contrast, younger age groups between 6 and 34 years are expected to experience a decline in population.

Table 6 – Population Projections by Age Group

Age Group	2022	2060	2022-2060 Change	2022-2060 annual growth rate	2022 Share	2060 Share
Fresno County Total	1,010,550	1,128,530	117,980	0.29%	100.00%	100.00%
5 and below	81,330	81,740	410	0.01%	8.05%	7.24%
6 to 14	142,420	124,450	-17,970	-0.35%	14.09%	11.03%
15 to 19	78,900	71,820	-7,080	-0.25%	7.81%	6.36%
20 to 24	72,980	71,990	-990	-0.04%	7.22%	6.38%
25 to 34	145,360	138,070	-7,290	-0.14%	14.38%	12.23%
35 to 44	132,560	136,810	4,250	0.08%	13.12%	12.12%
45 to 54	109,310	149,950	40,640	0.84%	10.82%	13.29%
55 to 64	106,800	127,760	20,960	0.47%	10.57%	11.32%
65 to 74	83,250	112,500	29,250	0.80%	8.24%	9.97%
75 and above	57,650	113,440	55,790	1.80%	5.70%	10.05%

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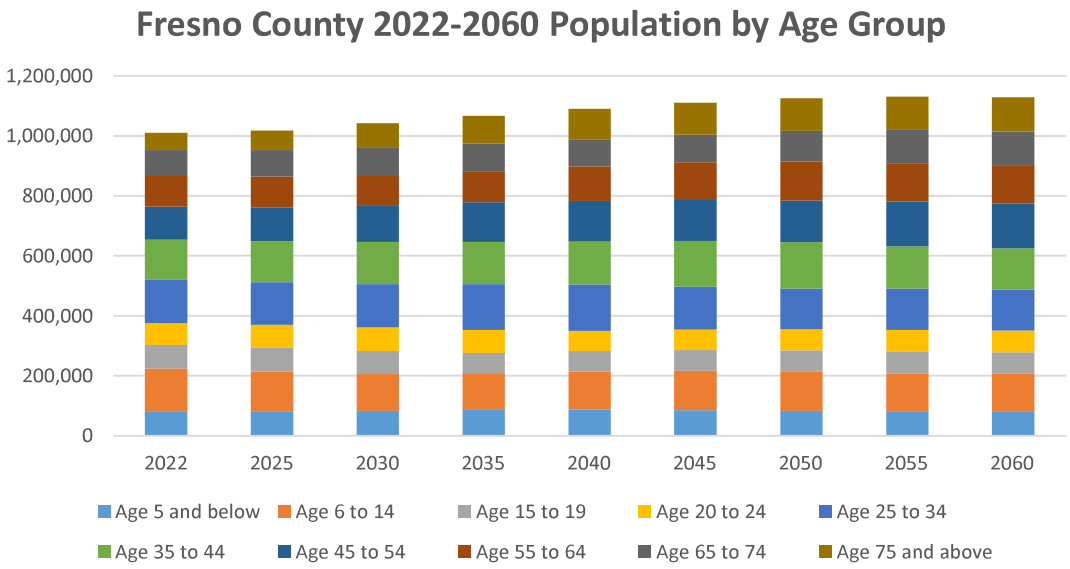

RACE/ETHNICITY

In Fresno County, out of a total population of 1,010,550, Hispanic or Latino individuals represent the largest racial/ethnic group, totaling 546,390 (54.1 percent). White individuals who are not Hispanic or Latino are the second largest group, with a population of 267,220 (26.4 percent). The Hispanic or Latino population is projected to grow to 703,260 (62.3 percent) by 2060, an increase of 156,870 individuals between 2022 and 2060. In contrast, the White alone, not Hispanic or Latino population is expected to decline to 207,040, a decrease of 60,180 from its current level.

Table 7 – Population Projections by Race/Ethnicity

Race/Ethnicity	2022	2060	2022-2060 Change	2022-2060 annual growth rate	2022 Share	2060 Share
Fresno County	1,010,550	1,128,530	117,980	0.29%	100.00%	100.00%
White alone, NH	267,220	207,040	-60,180	-0.67%	26.44%	18.35%
Hispanic or Latino	546,390	703,260	156,870	0.67%	54.07%	62.32%
Black or African American alone, NH	44,260	47,400	3,140	0.18%	4.38%	4.20%
Asian alone, NH	110,640	127,170	16,530	0.37%	10.95%	11.27%
Native Hawaiian and Other Pacific Islander alone, NH	1,250	1,250	0	0.00%	0.12%	0.11%
American Indian and Alaska Native alone, NH	6,060	5,640	-420	-0.19%	0.60%	0.50%
Some Other Race alone, NH	5,240	5,770	530	0.25%	0.52%	0.51%
Two or more races, NH	29,500	31,010	1,510	0.13%	2.92%	2.75%

NH: not Hispanic or Latino

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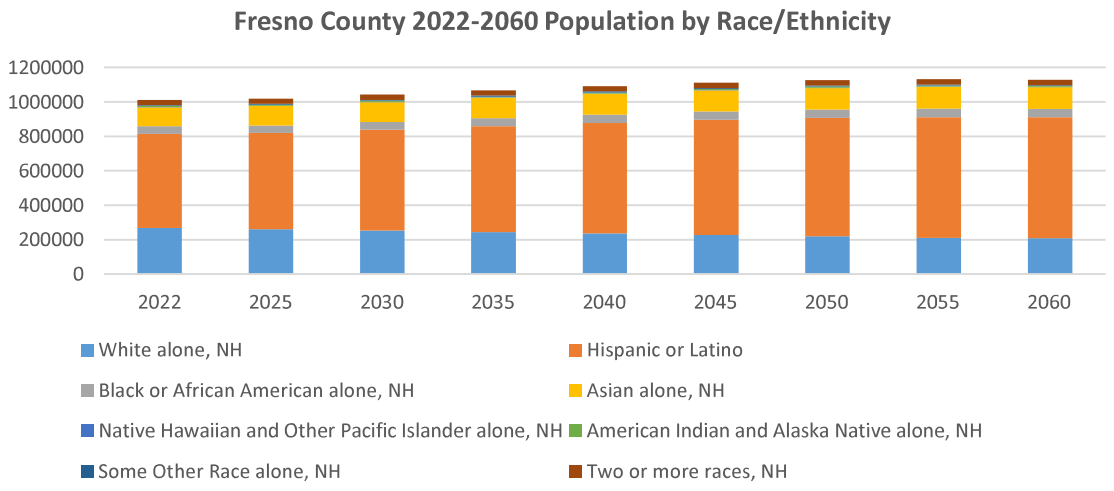

NH: not Hispanic or Latino

SCHOOL ENROLLMENT

In 2022, Fresno County is estimated to have approximately 220,496 school-aged children. This projection combines the school-aged youth population from Fresno COG's estimates with the K-12 participation rate from the California Department of Finance (DOF). It anticipates that K-12 public school enrollment will decrease to 192,984 by 2050, which is 11,170 fewer than the 2022 enrollment figure of 204,154

Table 8 - Fresno County Public School Enrollment of School-Age Children

Year	Total School-Age Youth (5 to 18)	K-12 Enrollment Projections	Participation Rate
2022	220,496	204,154	92.59%
2025	210,190	199,521	94.92%
2030	196,569	189,999	96.66%
2035	190,295	185,207	97.33%
2040	196,001	192,689	98.31%
2045	200,145	197,717	98.79%
2050	201,629	199,182	98.79%
2055	198,102	195,699	98.79%
2060	195,354	192,984	98.79%
2022-2060 change	-25,141	-11,170	
2022-2060 annual growth rate	-0.32%	-0.15%	

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HOUSEHOLD INCOME

The income projection indicates a steady increase in average household income over the coming decades. The projected average household incomes declines in 2022 to 2024, then recover in 2026. The growth accelerates in subsequent years, reaching approximately $102,970 by 2035. By 2060, the average household income is projected to reach $128,920, demonstrating consistent growth throughout the period. Overall, this projection suggests a positive economic outlook for households, with an overall increase of nearly $34,490 from 2022 to 2060.

Table 9 - Fresno County Household Income Projection

	2022	2025	2030	2035	2040	2045	2050	2055	2060
Mean Household Income (In 2022 Dollar)	$94,430	$93,570	$97,840	$102,970	$108,650	$114,230	$119,440	$124,150	$128,920
Annual Growth Rate		-0.30%	0.90%	1.03%	1.08%	1.01%	0.90%	0.78%	0.76%

EMPLOYMENT

The total employment have recovered to the pre-pandemic level since fall of 2022. Total jobs in Fresno County are projected to increase by 77,170 jobs, from 414,750 in 2022 to 491,920 in 2060. This reflects a 0.45 percent compound annual growth rate (CAGR) over the entire period. The industrial sector is projected to have the highest growth rate.

Table 10 - Fresno County Employment Projections by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	68,200	67,870	71,460	74,920	78,790	82,460	86,330	90,300	94,570
Retail	39,390	39,800	41,200	42,400	43,300	44,200	44,800	45,100	45,300
Office	50,350	50,800	52,400	54,200	56,200	58,000	59,700	61,300	62,800
Education	38,880	39,190	40,180	41,060	42,040	42,810	43,390	43,570	43,460
Health/Medical	75,170	75,780	76,960	78,250	79,540	80,630	81,420	81,810	81,800
Services	18,700	19,000	20,000	20,950	21,950	22,750	23,350	23,750	23,750
Food	32,360	32,710	33,420	34,380	35,090	35,800	36,320	36,630	36,740
Other	67,250	71,200	71,800	70,600	71,400	72,500	73,500	74,500	75,500
Government	24,450	24,800	25,300	25,900	26,500	27,000	27,500	27,800	28,000
Total	**414,750**	**421,150**	**432,720**	**442,660**	**454,810**	**466,150**	**476,310**	**484,760**	**491,920**
Total Annual Growth Rate		0.51%	0.54%	0.46%	0.54%	0.49%	0.43%	0.35%	0.29%

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Table 11 – Employment Projections by Jurisdiction, 2022-2060

Jurisdiction	2022	2025	2030	2035	2040	2045	2050	2055	2060	2022 Share	2060 Share
County Total	414,750	421,140	432,740	442,600	454,800	466,150	476,330	484,780	491,920	100.00%	100.00%
Clovis SOI	40,550	41,260	43,220	44,860	46,580	48,130	49,430	50,390	51,050	9.8%	9.8%
Coalinga SOI	5,010	5,020	5,100	5,170	5,250	5,320	5,380	5,420	5,460	1.2%	1.2%
Firebaugh SOI	2,230	2,160	2,320	2,450	2,590	2,720	2,840	2,950	3,050	0.5%	0.5%
Fowler SOI	3,990	4,190	4,390	4,680	5,000	5,290	5,590	5,810	6,010	1.0%	1.0%
Fresno SOI (incl. county islands)	260,210	260,420	265,950	271,760	277,970	283,670	288,820	293,150	296,870	62.7%	61.8%
Huron SOI	1,080	1,140	1,170	1,230	1,280	1,340	1,390	1,430	1,460	0.3%	0.3%
Kerman SOI	4,320	4,560	4,860	5,160	5,470	5,760	5,990	6,170	6,280	1.0%	1.1%
Kingsburg SOI	5,240	5,320	5,580	5,880	6,210	6,500	6,760	6,970	7,140	1.3%	1.3%
Mendota SOI	1,830	1,820	1,960	2,060	2,160	2,250	2,330	2,390	2,430	0.4%	0.4%
Orange Cove SOI	960	970	990	1,020	1,050	1,080	1,100	1,120	1,130	0.2%	0.2%
Parlier SOI	2,550	2,540	2,610	2,700	2,790	2,880	2,970	3,040	3,100	0.6%	0.6%
Reedley SOI	8,120	8,400	8,520	8,800	9,100	9,370	9,610	9,800	9,940	2.0%	2.0%
Sanger SOI	9,800	9,720	10,050	10,340	10,660	10,960	11,240	11,480	11,700	2.4%	2.3%
San Joaquin SOI	650	630	640	650	660	670	680	690	690	0.2%	0.1%
Selma SOI	9,280	11,510	12,490	11,320	11,670	12,000	12,290	12,520	12,710	2.2%	2.7%
Unincorporated Areas (excl. SOIs)	58,920	61,480	62,890	64,580	66,360	68,210	69,910	71,450	72,900	14.2%	14.6%

METHODOLOGY

The study process began by developing a range of total population and employment projections for the county as a whole, reflecting varying assumptions about Fresno County's future share of regional growth as well as trends in industry growth. The employment projection methodology used an economic base approach, forecasting export industry sectors, while local serving business sectors follow growth in the economic base and in the population.

This report consulted a variety of data sources on employment, population and demographic data. A brief description of these sources is provided below. A more complete description of the underlying methodology may be found in the Fresno COG Projections 2015-2050 Report published in 2017.

CA Employment Development Department (EDD). Data includes historical labor force and wage and salary jobs by industry from the Census of Employment and Wages (CEW). This report used the 2022 countywide figures as the baseline for employment projections and the Fresno COG SOI data as the baseline for city projections.

CA Department of Finance (DOF). This report utilizes the total population estimates for 2022 and 2023 from the DOF as the baseline for our population projections. We adjusted our forecast to align with the most recent DOF projections(Sep. 2024) for Fresno county. Additionally, we incorporated DOF's historical estimates related to population and housing into our forecast.

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Decennial Census & American Community Survey (ACS)

We gathered 2020 Census Decennial population data by age, sex and race at city-level. And information on vacancy rate and overcrowding rate was obtained from 2018-2022 5-year ACS, while average household income was sourced from 2022 1-year ACS.

Woods and Poole (W&P)

W&P is an independent economic forecasting firm that provides projections for all counties in the U.S. based on an econometric model that forecasts US economic conditions and creates state, regional and county forecasts based on changing conditions. The 2023 -2060 projections including population, employment by major industry and a number of other economic indicators. W&P uses the U.S. Bureau of Economic Analysis (BEA) definition of employment which includes self-employed and other non-employer jobs. The job figures therefore are always higher than wage and salary employment, but the growth rates provide a good basis for projected economic growth in the county.

Wide-ranging ONline Data for Epidemiologic Research (CDC WONDER).

An essential component of the population cohort survival model we applied for projecting future population was birth and death rate data. We derived race- and age-specific birth rates from the CDC WONDER database. For the mortality rates, we generated sex-, race-, and age-specific rates from the same database and adjusted them to reflect pre-COVID levels.

DETAILED PROJECTIONS

The following sections provide the detailed projections for each jurisdiction. All data reflect the sphere of influence (SOI) for each jurisdiction.

Clovis and SOI

Table 12 – Population Projection for Clovis SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	126,960	126,530	430	45,318	2.79
2025	129,050	128,620	430	46,841	2.78
2030	136,500	136,020	480	49,705	2.77
2035	142,490	142,000	490	51,888	2.76
2040	148,310	147,800	510	53,645	2.77
2045	153,300	152,770	530	55,264	2.78
2050	156,650	156,100	550	56,470	2.78
2055	158,000	157,450	550	57,149	2.76
2060	157,380	156,830	550	56,924	2.75
2022-2060 change	30,420	30,300	120	11,607	
2022-2060 annual growth rate	0.57%	0.57%	0.65%	0.60%	

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Table 13 – Job Projection for Clovis SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	3,910	3,890	4,090	4,290	4,510	4,710	4,930	5,150	5,390
Retail	6,920	7,050	7,290	7,540	7,800	8,060	8,270	8,430	8,570
Office	4,170	4,280	4,950	5,260	5,600	5,830	5,960	5,960	5,850
Education	4,830	4,900	5,090	5,270	5,460	5,630	5,780	5,880	5,940
Health/Medical	7,390	7,510	7,720	7,950	8,180	8,390	8,580	8,720	8,830
Services	2,490	2,550	2,720	2,880	3,050	3,200	3,320	3,420	3,460
Food	5,710	5,810	6,000	6,220	6,430	6,630	6,810	6,950	7,050
Other	3,650	3,760	3,790	3,840	3,880	3,940	3,990	4,050	4,100
Government	1,480	1,510	1,560	1,620	1,670	1,730	1,780	1,820	1,860
Total	**40,550**	**41,260**	**43,220**	**44,860**	**46,580**	**48,130**	**49,430**	**50,390**	**51,050**

Table 14 – Housing Unit Projection for Clovis SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	2,057	1,760	297
2022-2030	5,082	4,348	733
2022-2035	7,382	6,291	1,091
2022-2040	9,238	7,847	1,391
2022-2045	10,948	9,276	1,672
2022-2050	12,220	10,338	1,881
2022-2055	12,936	10,936	2,000
2022-2060	12,699	10,738	1,961

Table 15 – Population Projection for Clovis SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	126,960	129,054	136,500	142,494	148,314	153,303	156,648	158,002	157,381	30,420	0.6%	100.0%	100.0%
5 and below	9,330	9,401	9,974	10,590	11,157	11,226	10,921	10,688	10,634	1,304	0.3%	7.3%	6.8%
6 to 14	16,949	15,828	14,834	15,350	16,076	17,030	17,421	16,983	16,634	-315	0.0%	13.4%	10.6%
15 to 19	9,676	9,858	9,701	8,427	8,774	9,051	9,571	9,884	9,805	129	0.0%	7.6%	6.2%
20 to 24	8,284	9,132	10,212	9,955	8,656	9,000	9,227	9,662	9,757	1,473	0.4%	6.5%	6.2%
25 to 34	16,041	15,849	17,585	20,130	20,928	19,309	18,172	18,520	18,555	2,513	0.4%	12.6%	11.8%
35 to 44	17,535	17,495	16,996	16,694	18,371	21,018	21,680	19,685	18,975	1,440	0.2%	13.8%	12.1%
45 to 54	15,063	15,622	17,550	18,207	17,536	17,214	18,810	21,177	21,533	6,470	0.9%	11.9%	13.7%
55 to 64	14,130	14,080	14,450	15,724	17,524	18,159	17,346	16,758	16,814	2,684	0.5%	11.1%	10.7%
65 to 74	11,685	12,080	13,115	13,242	13,499	14,698	16,271	16,574	16,247	4,562	0.9%	9.2%	10.3%
75 and above	8,267	9,708	12,083	14,175	15,792	16,598	17,228	18,071	18,427	10,159	2.13%	6.51%	11.71%

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Table 16 – Population Projection for Clovis SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	126,960	129,054	136,500	142,494	148,314	153,303	156,648	158,002	157,381	30,420	0.6%	100.0%	100.0%
White alone, NH	62,082	62,150	63,958	64,834	65,465	65,691	65,308	64,268	63,450	1,368	0.1%	48.9%	40.3%
Hispanic or Latino	38,395	39,807	43,611	47,197	50,861	54,297	57,138	59,186	59,533	21,138	1.2%	30.2%	37.8%
Black or African American alone, NH	2,981	3,017	3,173	3,293	3,407	3,497	3,557	3,588	3,577	596	0.5%	2.3%	2.3%
Asian alone, NH	15,627	16,084	17,290	18,277	19,237	20,088	20,710	21,041	21,001	5,374	0.8%	12.3%	13.3%
Native Hawaiian and Other Pacific Islander alone, NH	275	277	287	292	295	294	287	273	265	-11	-0.1%	0.2%	0.2%
American Indian and Alaska Native alone, NH	793	803	843	870	886	893	889	872	860	66	0.2%	0.6%	0.5%
Some Other Race alone, NH	698	706	739	773	815	850	868	866	857	159	0.5%	0.6%	0.5%
Two or more races, NH	6,108	6,210	6,600	6,957	7,347	7,693	7,891	7,908	7,838	1,730	0.7%	4.8%	5.0%

Coalinga and SOI

Table 17 – Population Projection for Coalinga SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	17,290	12,780	4,510	4,304	2.97
2025	17,300	12,780	4,520	4,372	2.94
2030	17,530	13,160	4,370	4,517	2.93
2035	17,770	13,580	4,190	4,660	2.93
2040	17,990	13,960	4,030	4,760	2.95
2045	18,190	14,160	4,030	4,812	2.95
2050	18,320	14,300	4,020	4,859	2.95
2055	18,370	14,340	4,030	4,890	2.94
2060	18,350	14,320	4,030	4,883	2.93
2022-2060 change	1,060	1,550	-490	579	
2022-2060 annual growth rate	0.16%	0.30%	-0.30%	0.33%	

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Table 18 – Job Projection for Coalinga SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	260	260	270	280	300	310	330	340	360
Retail	320	320	330	330	340	340	340	340	340
Office	200	180	180	180	190	200	210	240	280
Education	1,140	1,150	1,170	1,180	1,200	1,210	1,210	1,210	1,190
Health/Medical	450	450	460	460	460	470	470	460	460
Services	40	40	40	40	50	50	50	50	50
Food	260	260	260	270	270	270	270	270	270
Other	250	260	260	270	270	270	280	280	290
Government	2,080	2,100	2,120	2,150	2,180	2,200	2,220	2,220	2,220
Total	**5,010**	**5,020**	**5,100**	**5,170**	**5,250**	**5,320**	**5,380**	**5,420**	**5,460**

Table 19 – Housing Unit Projection for Coalinga SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	348	157	191
2022-2030	512	231	281
2022-2035	675	320	354
2022-2040	788	388	400
2022-2045	847	427	420
2022-2050	900	461	439
2022-2055	935	484	451
2022-2060	927	479	448

Table 20 – Population Projection for Coalinga SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	17,294	17,299	17,534	17,767	17,993	18,187	18,317	18,370	18,345	1,051	0.2%	100.0%	100.0%
5 and below	1,073	1,089	1,122	1,170	1,172	1,151	1,126	1,137	1,148	75	0.2%	6.2%	6.3%
6 to 14	1,977	1,757	1,614	1,646	1,727	1,785	1,782	1,750	1,738	-239	-0.3%	11.4%	9.5%
15 to 19	1,073	1,121	1,031	892	905	953	1,012	1,019	1,011	-63	-0.2%	6.2%	5.5%
20 to 24	1,209	1,095	1,112	1,027	895	914	967	1,027	1,035	-174	-0.4%	7.0%	5.6%
25 to 34	3,209	2,955	2,322	2,181	2,133	1,937	1,838	1,916	1,956	-1,253	-1.3%	18.6%	10.7%
35 to 44	2,908	3,041	3,246	2,883	2,295	2,189	2,165	1,976	1,886	-1,021	-1.1%	16.8%	10.3%
45 to 54	2,031	2,196	2,571	2,926	3,160	2,845	2,296	2,205	2,225	194	0.2%	11.7%	12.1%
55 to 64	2,060	1,923	1,867	2,039	2,412	2,780	3,037	2,742	2,497	437	0.5%	11.9%	13.6%
65 to 74	1,153	1,417	1,691	1,649	1,623	1,807	2,159	2,493	2,620	1,468	2.2%	6.7%	14.3%
75 and above	601	705	958	1,354	1,671	1,826	1,935	2,104	2,229	1,628	3.51%	3.47%	12.15%

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CONT

Table 21 – Population Projection for Coalinga SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	17,294	17,299	17,534	17,767	17,993	18,187	18,317	18,370	18,345	1,051	0.2%	100.0%	100.0%
White alone, NH	4,717	4,615	4,481	4,325	4,160	3,989	3,810	3,631	3,557	-1,160	-0.7%	27.3%	19.4%
Hispanic or Latino	11,069	11,200	11,604	12,033	12,474	12,883	13,236	13,513	13,581	2,512	0.5%	64.0%	74.0%
Black or African American alone, NH	607	592	563	533	503	474	446	420	409	-198	-1.0%	3.5%	2.2%
Asian alone, NH	362	362	366	367	359	357	358	359	358	-4	0.0%	2.1%	2.0%
Native Hawaiian and Other Pacific Islander alone, NH	24	24	23	22	21	20	19	18	17	-8	-1.0%	0.1%	0.1%
American Indian and Alaska Native alone, NH	110	106	100	94	87	81	72	64	61	-49	-1.6%	0.6%	0.3%
Some Other Race alone, NH	65	63	60	56	53	50	47	44	42	-23	-1.1%	0.4%	0.2%
Two or more races, NH	340	338	338	337	336	334	329	323	320	-19	-0.2%	2.0%	1.7%

Firebaugh and SOI

Table 22 – Population Projection for Firebaugh SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	8,420	8,400	20	2,238	3.75
2025	8,410	8,400	10	2,280	3.71
2030	8,670	8,660	10	2,358	3.70
2035	8,830	8,820	10	2,401	3.69
2040	8,990	8,970	20	2,427	3.70
2045	9,120	9,100	20	2,455	3.72
2050	9,210	9,190	20	2,479	3.71
2055	9,250	9,230	20	2,497	3.70
2060	9,230	9,210	20	2,492	3.69
2022-2060 change	810	810	0	255	
2022-2060 annual growth rate	0.24%	0.24%	0.00%	0.28%	

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CONT

Table 23 – Job Projection for Firebaugh SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	1,310	1,300	1,370	1,430	1,510	1,580	1,650	1,720	1,800
Retail	100	90	100	110	110	120	120	130	130
Office	60	10	30	50	80	100	110	110	100
Education	270	270	290	300	310	330	340	350	360
Health/Medical	130	130	140	150	150	160	160	170	170
Services	50	50	60	60	70	70	80	80	80
Food	100	100	110	110	120	120	130	130	140
Other	140	140	140	150	150	150	150	150	160
Government	80	70	80	80	90	90	100	100	100
Total	**2,230**	**2,160**	**2,320**	**2,450**	**2,590**	**2,720**	**2,840**	**2,950**	**3,050**

Table 24 – Housing Unit Projection for Firebaugh SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	328	217	110
2022-2030	418	277	141
2022-2035	468	314	154
2022-2040	498	337	160
2022-2045	530	364	166
2022-2050	557	386	171
2022-2055	578	403	175
2022-2060	573	399	174

Table 25 – Population Projection for Firebaugh SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	8,417	8,413	8,671	8,831	8,987	9,120	9,209	9,246	9,229	812	0.2%	100.0%	100.0%
5 and below	692	676	727	773	777	747	707	679	679	-13	-0.1%	8.2%	7.4%
6 to 14	1,376	1,201	1,055	1,026	1,097	1,146	1,130	1,077	1,049	-327	-0.7%	16.3%	11.4%
15 to 19	762	779	685	595	542	579	627	631	624	-139	-0.5%	9.1%	6.8%
20 to 24	695	726	769	668	583	535	574	621	624	-71	-0.3%	8.3%	6.8%
25 to 34	1,206	1,253	1,334	1,445	1,387	1,218	1,096	1,089	1,119	-87	-0.2%	14.3%	12.1%
35 to 44	975	970	1,121	1,196	1,265	1,386	1,342	1,183	1,091	116	0.3%	11.6%	11.8%
45 to 54	916	903	900	916	1,051	1,133	1,210	1,330	1,357	441	1.0%	10.9%	14.7%
55 to 64	915	903	835	824	814	839	972	1,049	1,065	150	0.4%	10.9%	11.5%
65 to 74	527	629	769	771	710	709	705	731	781	254	1.0%	6.3%	8.5%
75 and above	353	373	477	618	761	829	846	856	840	487	2.31%	4.19%	9.10%

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CONT

Table 26 – Population Projection for Firebaugh SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	8,417	8,413	8,671	8,831	8,987	9,120	9,209	9,246	9,229	812	0.2%	100.0%	100.0%
White alone, NH	522	506	496	484	475	467	462	449	443	-79	-0.4%	6.2%	4.8%
Hispanic or Latino	7,786	7,804	8,075	8,245	8,409	8,554	8,658	8,715	8,708	922	0.3%	92.5%	94.4%
Black or African American alone, NH	30	28	25	22	19	16	14	12	11	-19	-2.6%	0.4%	0.1%
Asian alone, NH	16	15	14	13	12	10	9	7	7	-9	-2.3%	0.2%	0.1%
Native Hawaiian and Other Pacific Islander alone, NH	3	3	3	2	2	2	2	1	1	-2	-2.2%	0.0%	0.0%
American Indian and Alaska Native alone, NH	3	3	3	2	2	2	1	1	0	-3	-5.4%	0.0%	0.0%
Some Other Race alone, NH	27	26	30	38	46	49	47	46	45	17	1.3%	0.3%	0.5%
Two or more races, NH	30	28	26	24	22	20	17	15	14	-16	-2.0%	0.4%	0.2%

Fowler and SOI

Table 27 – Population Projection for Fowler SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	7,310	7,250	60	2,271	3.19
2025	7,660	7,600	60	2,421	3.21
2030	8,240	8,180	60	2,614	3.18
2035	8,910	8,840	70	2,825	3.18
2040	9,550	9,480	70	3,009	3.19
2045	10,110	10,030	80	3,173	3.19
2050	10,480	10,400	80	3,289	3.18
2055	10,630	10,550	80	3,348	3.16
2060	10,560	10,480	80	3,326	3.15
2022-2060 change	3,250	3,230	20	1,055	
2022-2060 annual growth rate	0.97%	0.97%	0.76%	1.01%	

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CONT

Table 28 – Job Projection for Fowler SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	1,260	1,320	1,380	1,500	1,640	1,780	1,920	2,060	2,200
Retail	130	140	150	160	170	180	200	210	220
Office	310	370	440	510	590	640	650	630	580
Education	330	340	350	360	370	380	390	400	410
Health/Medical	380	380	390	410	430	450	480	500	520
Services	70	80	80	90	100	110	120	130	140
Food	220	240	260	290	320	350	400	430	460
Other	1,240	1,270	1,280	1,300	1,310	1,330	1,350	1,370	1,390
Government	50	50	60	60	70	70	80	80	90
Total	**3,990**	**4,190**	**4,390**	**4,680**	**5,000**	**5,290**	**5,590**	**5,810**	**6,010**

Table 29 – Housing Unit Projection for Fowler SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	215	206	10
2022-2030	422	403	19
2022-2035	647	578	69
2022-2040	844	714	130
2022-2045	1,019	819	200
2022-2050	1,143	893	250
2022-2055	1,205	931	275
2022-2060	1,182	917	266

Table 30 – Population Projection for Fowler SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	7,306	7,658	8,245	8,909	9,555	10,108	10,479	10,629	10,560	3,254	1.0%	100.0%	100.0%
5 and below	528	560	633	715	775	776	762	751	746	217	0.9%	7.2%	7.1%
6 to 14	1,013	948	859	974	1,086	1,198	1,225	1,182	1,155	142	0.3%	13.9%	10.9%
15 to 19	628	624	619	481	556	612	678	701	685	57	0.2%	8.6%	6.5%
20 to 24	518	628	652	650	504	579	630	685	696	178	0.8%	7.1%	6.6%
25 to 34	922	904	1,149	1,371	1,395	1,231	1,132	1,234	1,253	331	0.8%	12.6%	11.9%
35 to 44	987	1,045	1,011	985	1,253	1,483	1,480	1,266	1,168	182	0.4%	13.5%	11.1%
45 to 54	920	967	1,034	1,124	1,089	1,052	1,315	1,508	1,529	609	1.3%	12.6%	14.5%
55 to 64	798	823	925	1,005	1,078	1,162	1,102	1,035	1,096	299	0.8%	10.9%	10.4%
65 to 74	588	672	753	802	903	973	1,025	1,071	1,042	454	1.5%	8.1%	9.9%
75 and above	403	487	610	800	917	1,041	1,130	1,196	1,190	787	2.89%	5.52%	11.26%

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CONT

Table 31 – Population Projection for Fowler SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	7,306	7,658	8,245	8,909	9,555	10,108	10,479	10,629	10,560	3,254	1.0%	100.0%	100.0%
White alone, NH	1,246	1,268	1,297	1,335	1,371	1,393	1,393	1,354	1,323	77	0.2%	17.1%	12.5%
Hispanic or Latino	4,881	5,161	5,645	6,192	6,731	7,205	7,543	7,731	7,712	2,831	1.2%	66.8%	73.0%
Black or African American alone, NH	94	98	104	113	121	128	134	138	137	43	1.0%	1.3%	1.3%
Asian alone, NH	926	969	1,035	1,105	1,168	1,211	1,234	1,235	1,223	297	0.7%	12.7%	11.6%
Native Hawaiian and Other Pacific Islander alone, NH	0	0	0	0	0	0	0	0	0	0	NA	0.0%	0.0%
American Indian and Alaska Native alone, NH	28	29	30	31	31	31	31	29	28	0	0.0%	0.4%	0.3%
Some Other Race alone, NH	41	42	42	42	41	39	36	33	31	-10	-0.8%	0.6%	0.3%
Two or more races, NH	89	91	92	92	91	100	106	109	105	16	0.4%	1.2%	1.0%

Fresno and SOI

The projection for Fresno SOI contains approximately 38,000 population of county islands.

Table 32 – Population Projection for Fresno SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	592,280	581,180	11,100	195,577	2.97
2025	595,370	584,200	11,170	197,366	2.97
2030	605,800	594,040	11,760	203,870	2.93
2035	617,840	605,820	12,020	207,914	2.93
2040	629,520	617,280	12,240	210,426	2.94
2045	639,540	627,100	12,440	213,059	2.95
2050	646,260	633,690	12,570	215,297	2.95
2055	648,980	636,360	12,620	216,928	2.94
2060	647,730	635,130	12,600	216,511	2.93
2022-2060 change	55,450	53,960	1,490	20,934	
2022-2060 annual growth rate	0.24%	0.23%	0.33%	0.27%	

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CONT

Table 33 –Job Projection for Fresno SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	40,480	40,240	42,380	44,400	46,650	48,790	51,040	53,360	55,850
Retail	25,660	25,820	26,240	26,650	27,050	27,440	27,640	27,650	27,600
Office	39,760	38,630	39,250	40,170	41,220	42,320	43,630	45,200	46,990
Education	23,700	23,810	24,260	24,640	25,080	25,390	25,580	25,530	25,310
Health/Medical	59,070	59,340	59,890	60,510	61,120	61,570	61,780	61,680	61,280
Services	13,400	13,560	14,180	14,730	15,330	15,790	16,100	16,270	16,170
Food	21,580	21,720	22,040	22,430	22,740	23,040	23,220	23,260	23,170
Other	18,950	19,500	19,670	19,900	20,120	20,430	20,710	20,990	21,280
Government	17,620	17,800	18,040	18,350	18,660	18,890	19,110	19,200	19,210
Total	**260,210**	**260,420**	**265,950**	**271,760**	**277,970**	**283,670**	**288,820**	**293,150**	**296,870**

Table 34 – Housing Unit Projection for Fresno SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	16,282	11,704	4,578
2022-2030	23,527	16,912	6,615
2022-2035	28,025	19,546	8,478
2022-2040	30,823	20,999	9,824
2022-2045	33,758	22,328	11,430
2022-2050	36,247	23,454	12,793
2022-2055	38,062	24,276	13,786
2022-2060	37,598	24,066	13,532

Table 35 – Population Projection for Fresno SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	592,284	595,370	605,799	617,835	629,523	639,541	646,258	648,977	647,729	55,446	0.2%	100.0%	100.0%
5 and below	50,339	50,435	50,503	49,991	49,602	49,017	48,381	48,006	47,853	-2,485	-0.1%	8.5%	7.4%
6 to 14	83,674	78,940	74,001	74,963	74,735	74,451	73,722	72,455	71,815	-11,859	-0.4%	14.1%	11.1%
15 to 19	44,581	45,921	44,807	40,135	41,456	41,505	41,323	40,874	40,493	-4,088	-0.3%	7.5%	6.3%
20 to 24	43,761	42,490	45,072	44,337	39,906	41,321	41,314	40,976	40,705	-3,055	-0.2%	7.4%	6.3%
25 to 34	92,318	89,311	84,116	85,600	88,148	83,441	80,469	81,495	81,087	-11,231	-0.3%	15.6%	12.5%
35 to 44	78,821	83,345	87,265	85,896	81,952	84,005	86,589	81,535	79,576	755	0.0%	13.3%	12.3%
45 to 54	61,597	62,907	70,551	79,196	83,985	83,238	79,506	81,094	82,316	20,719	0.8%	10.4%	12.7%
55 to 64	59,394	57,861	55,726	57,763	65,689	74,233	78,777	77,603	75,365	15,971	0.6%	10.0%	11.6%
65 to 74	46,361	48,515	50,411	49,529	48,397	50,623	57,734	64,847	66,891	20,529	1.0%	7.8%	10.3%
75 and above	31,438	35,644	43,348	50,425	55,652	57,705	58,443	60,092	61,630	30,192	1.79%	5.31%	9.51%

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CONT

Table 36 – Population Projection for Fresno SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	592,284	595,370	605,799	617,835	629,523	639,541	646,258	648,977	647,729	55,446	0.2%	100.0%	100.0%
White alone, NH	142,319	138,680	133,694	128,622	123,246	117,925	112,940	108,406	106,482	-35,837	-0.8%	24.0%	16.4%
Hispanic or Latino	303,595	309,286	322,138	336,621	351,117	364,132	374,287	381,156	382,314	78,718	0.6%	51.3%	59.0%
Black or African American alone, NH	38,479	38,450	38,679	39,067	39,529	39,977	40,293	40,404	40,318	1,839	0.1%	6.5%	6.2%
Asian alone, NH	82,027	83,086	85,155	87,008	88,707	90,298	91,559	92,229	92,126	10,099	0.3%	13.8%	14.2%
Native Hawaiian and Other Pacific Islander alone, NH	810	818	830	837	841	842	837	824	817	7	0.0%	0.1%	0.1%
American Indian and Alaska Native alone, NH	3,886	3,864	3,856	3,842	3,818	3,771	3,691	3,583	3,528	-358	-0.3%	0.7%	0.5%
Some Other Race alone, NH	3,183	3,200	3,248	3,309	3,374	3,436	3,473	3,466	3,445	262	0.2%	0.5%	0.5%
Two or more races, NH	17,984	17,985	18,198	18,529	18,892	19,161	19,179	18,910	18,699	715	0.1%	3.0%	2.9%

Huron and SOI

Table 37 – Population Projection for Huron SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	6,170	6,170	0	1,588	3.89
2025	6,230	6,230	0	1,635	3.85
2030	6,260	6,260	0	1,647	3.81
2035	6,390	6,390	0	1,682	3.81
2040	6,520	6,520	0	1,705	3.84
2045	6,630	6,630	0	1,728	3.85
2050	6,710	6,710	0	1,747	3.85
2055	6,740	6,740	0	1,761	3.83
2060	6,720	6,720	0	1,757	3.82
2022-2060 change	550	550	0	169	
2022-2060 annual growth rate	0.22%	0.22%	-	0.27%	

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CONT

Table 38 – Job Projection for Huron SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	250	250	260	270	290	300	310	330	340
Retail	90	90	100	110	120	130	140	150	160
Office	10	40	30	40	50	60	60	40	30
Education	20	20	20	20	20	20	20	30	30
Health/Medical	100	100	110	120	130	140	150	160	170
Services	10	10	10	10	10	10	20	20	20
Food	10	10	10	10	10	10	10	10	10
Other	570	580	590	600	600	610	620	630	640
Government	40	40	50	50	60	60	70	70	80
Total	**1,080**	**1,140**	**1,170**	**1,230**	**1,280**	**1,340**	**1,390**	**1,430**	**1,460**

Table 39 – Housing Unit Projection for Huron SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	469	175	294
2022-2030	484	180	303
2022-2035	527	197	330
2022-2040	555	209	347
2022-2045	584	220	364
2022-2050	608	230	378
2022-2055	625	237	388
2022-2060	621	235	385

Table 40 – Population Projection for Huron SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	6,167	6,235	6,258	6,392	6,521	6,632	6,707	6,737	6,723	556	0.2%	100.0%	100.0%
5 and below	601	523	528	584	614	608	555	516	507	-94	-0.4%	9.7%	7.5%
6 to 14	1,119	1,006	819	723	800	868	894	852	820	-299	-0.8%	18.1%	12.2%
15 to 19	578	661	562	496	373	412	461	487	489	-89	-0.4%	9.4%	7.3%
20 to 24	458	524	631	545	482	363	404	453	464	6	0.0%	7.4%	6.9%
25 to 34	865	826	893	1,096	1,122	984	816	746	778	-87	-0.3%	14.0%	11.6%
35 to 44	790	831	820	760	834	1,030	1,065	941	872	83	0.3%	12.8%	13.0%
45 to 54	642	658	672	755	757	705	783	974	988	346	1.1%	10.4%	14.7%
55 to 64	579	568	563	578	600	677	685	643	649	71	0.3%	9.4%	9.7%
65 to 74	355	417	485	464	471	487	510	578	596	241	1.4%	5.8%	8.9%
75 and above	182	222	285	391	468	499	533	548	559	377	3.00%	2.95%	8.32%

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CONT

Table 41 – Population Projection for Huron SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	6,167	6,235	6,258	6,392	6,521	6,632	6,707	6,737	6,723	556	0.2%	100.0%	100.0%
White alone, NH	154	154	153	154	154	155	155	156	156	2	0.0%	2.5%	2.3%
Hispanic or Latino	5,904	5,975	6,001	6,130	6,256	6,365	6,445	6,481	6,470	566	0.2%	95.7%	96.2%
Black or African American alone, NH	26	25	23	21	19	17	15	13	13	-14	-1.9%	0.4%	0.2%
Asian alone, NH	44	43	46	53	60	66	63	60	59	15	0.8%	0.7%	0.9%
Native Hawaiian and Other Pacific Islander alone, NH	0	0	0	0	0	0	0	0	0	0	NA	0.0%	0.0%
American Indian and Alaska Native alone, NH	11	11	10	9	9	8	8	7	7	-4	-1.3%	0.2%	0.1%
Some Other Race alone, NH	8	8	7	7	7	7	6	6	6	-2	-0.6%	0.1%	0.1%
Two or more races, NH	20	20	19	18	16	15	14	13	13	-8	-1.2%	0.3%	0.2%

Kerman and SOI

Table 42 – Population Projection for Kerman SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	16,830	16,820	10	4,705	3.57
2025	17,360	17,350	10	4,947	3.57
2030	18,510	18,500	10	5,293	3.54
2035	19,650	19,640	10	5,619	3.54
2040	20,750	20,740	10	5,896	3.55
2045	21,700	21,690	10	6,145	3.56
2050	22,340	22,330	10	6,325	3.55
2055	22,600	22,590	10	6,420	3.53
2060	22,480	22,470	10	6,386	3.51
2022-2060 change	5,650	5,650	0	1,681	
2022-2060 annual growth rate	0.76%	0.77%	0.00%	0.81%	

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CONT

Table 43 – Job Projection for Kerman SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	460	460	480	510	530	560	580	610	640
Retail	680	710	760	810	870	920	980	1,030	1,080
Office	230	350	440	510	590	630	620	560	460
Education	630	660	700	750	810	860	910	960	1,000
Health/Medical	460	480	510	540	570	610	640	670	700
Services	70	80	80	90	100	110	120	120	130
Food	350	360	380	410	440	470	490	520	550
Other	1,200	1,230	1,240	1,260	1,270	1,290	1,310	1,330	1,340
Government	240	250	260	280	300	320	340	360	380
Total	**4,320**	**4,560**	**4,860**	**5,160**	**5,470**	**5,760**	**5,990**	**6,170**	**6,280**

Table 44 – Housing Unit Projection for Kerman SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	964	910	54
2022-2030	1,363	1,286	77
2022-2035	1,737	1,613	125
2022-2040	2,056	1,879	177
2022-2045	2,343	2,109	234
2022-2050	2,550	2,274	276
2022-2055	2,659	2,361	298
2022-2060	2,620	2,330	290

Table 45 – Population Projection for Kerman SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	16,826	17,356	18,507	19,647	20,754	21,703	22,340	22,597	22,479	5,653	0.8%	100.0%	100.0%
5 and below	1,403	1,432	1,573	1,743	1,832	1,800	1,708	1,664	1,658	255	0.4%	8.3%	7.4%
6 to 14	2,708	2,441	2,231	2,313	2,557	2,764	2,785	2,633	2,545	-164	-0.2%	16.1%	11.3%
15 to 19	1,575	1,659	1,475	1,281	1,270	1,394	1,531	1,564	1,534	-41	-0.1%	9.4%	6.8%
20 to 24	1,344	1,517	1,692	1,499	1,302	1,290	1,405	1,522	1,534	190	0.3%	8.0%	6.8%
25 to 34	2,243	2,331	2,733	3,283	3,261	2,860	2,623	2,681	2,742	499	0.5%	13.3%	12.2%
35 to 44	2,341	2,328	2,340	2,395	2,798	3,357	3,305	2,838	2,714	373	0.4%	13.9%	12.1%
45 to 54	1,837	1,985	2,276	2,364	2,368	2,420	2,806	3,295	3,203	1,367	1.5%	10.9%	14.3%
55 to 64	1,464	1,505	1,636	1,951	2,227	2,308	2,292	2,294	2,390	926	1.3%	8.7%	10.6%
65 to 74	1,241	1,328	1,403	1,386	1,504	1,791	2,026	2,052	2,012	771	1.3%	7.4%	8.9%
75 and above	671	831	1,149	1,432	1,634	1,721	1,859	2,054	2,148	1,477	3.11%	3.99%	9.56%

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CONT

Table 46 – Population Projection for Kerman SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	16,826	17,356	18,507	19,647	20,754	21,703	22,340	22,597	22,479	5,653	0.8%	100.0%	100.0%
White alone, NH	2,024	2,016	2,028	2,025	2,010	1,974	1,912	1,838	1,797	-227	-0.3%	12.0%	8.0%
Hispanic or Latino	13,198	13,713	14,798	15,878	16,957	17,920	18,624	18,985	18,932	5,734	1.0%	78.4%	84.2%
Black or African American alone, NH	66	64	61	68	75	78	73	69	66	0	0.0%	0.4%	0.3%
Asian alone, NH	1,217	1,241	1,290	1,333	1,358	1,368	1,361	1,334	1,316	99	0.2%	7.2%	5.9%
Native Hawaiian and Other Pacific Islander alone, NH	1	1	1	1	1	1	1	1	1	0	0.1%	0.0%	0.0%
American Indian and Alaska Native alone, NH	42	41	40	38	36	34	31	28	26	-15	-1.2%	0.2%	0.1%
Some Other Race alone, NH	90	89	90	97	103	109	115	119	120	29	0.7%	0.5%	0.5%
Two or more races, NH	189	191	199	206	214	219	222	223	221	32	0.4%	1.1%	1.0%

Kingsburg and SOI

Table 47 – Population Projection for Kingsburg SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	12,750	12,670	80	4,441	2.85
2025	13,210	13,110	100	4,692	2.85
2030	13,750	13,650	100	4,899	2.81
2035	14,550	14,450	100	5,187	2.82
2040	15,340	15,230	110	5,430	2.83
2045	16,010	15,900	110	5,650	2.84
2050	16,460	16,350	110	5,809	2.83
2055	16,650	16,530	120	5,893	2.81
2060	16,560	16,440	120	5,863	2.80
2022-2060 change	3,810	3,780	30	1,422	
2022-2060 annual growth rate	0.69%	0.69%	1.07%	0.74%	

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CONT

Table 48 – Job Projection for Kingsburg SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	1,690	1,680	1,770	1,850	1,950	2,040	2,130	2,230	2,330
Retail	810	830	870	910	960	1,000	1,040	1,080	1,110
Office	450	450	480	560	650	710	740	730	690
Education	450	460	480	510	530	560	580	600	610
Health/Medical	520	530	550	570	600	620	650	670	680
Services	110	110	120	130	140	150	160	160	170
Food	510	520	550	570	600	630	650	680	700
Other	590	600	610	620	620	630	640	650	660
Government	130	130	140	150	150	160	170	170	180
Total	**5,240**	**5,320**	**5,580**	**5,880**	**6,210**	**6,500**	**6,760**	**6,970**	**7,140**

Table 49 – Housing Unit Projection for Kingsburg SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	381	265	116
2022-2030	602	419	184
2022-2035	910	644	266
2022-2040	1,170	839	330
2022-2045	1,404	1,020	384
2022-2050	1,574	1,151	423
2022-2055	1,664	1,220	444
2022-2060	1,632	1,195	437

Table 50 – Population Projection for Kingsburg SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	12,754	13,206	13,746	14,555	15,340	16,013	16,464	16,647	16,563	3,809	0.7%	100.0%	100.0%
5 and below	913	956	1,025	1,102	1,161	1,160	1,145	1,144	1,145	232	0.6%	7.2%	6.9%
6 to 14	1,679	1,572	1,473	1,576	1,702	1,811	1,835	1,779	1,742	63	0.1%	13.2%	10.5%
15 to 19	974	1,005	947	852	903	973	1,031	1,052	1,034	60	0.2%	7.6%	6.2%
20 to 24	838	967	1,027	988	888	938	1,000	1,044	1,048	210	0.6%	6.6%	6.3%
25 to 34	1,575	1,614	1,800	2,096	2,141	1,987	1,907	1,983	2,004	428	0.6%	12.4%	12.1%
35 to 44	1,602	1,662	1,677	1,706	1,940	2,251	2,267	2,048	1,972	370	0.5%	12.6%	11.9%
45 to 54	1,442	1,502	1,606	1,735	1,786	1,810	2,032	2,293	2,299	856	1.2%	11.3%	13.9%
55 to 64	1,486	1,501	1,438	1,516	1,653	1,778	1,805	1,783	1,781	295	0.5%	11.6%	10.8%
65 to 74	1,285	1,336	1,401	1,418	1,387	1,457	1,566	1,640	1,639	354	0.6%	10.1%	9.9%
75 and above	960	1,090	1,351	1,566	1,780	1,848	1,876	1,881	1,899	939	1.81%	7.53%	11.46%

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CONT

Table 51 – Population Projection for Kingsburg SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	12,754	13,206	13,746	14,555	15,340	16,013	16,464	16,647	16,563	3,809	0.7%	100.0%	100.0%
White alone, NH	5,593	5,680	5,712	5,841	5,954	6,028	6,021	5,924	5,833	239	0.1%	43.9%	35.2%
Hispanic or Latino	6,115	6,437	6,892	7,506	8,127	8,695	9,136	9,418	9,438	3,323	1.1%	47.9%	57.0%
Black or African American alone, NH	46	45	42	40	38	36	32	29	27	-20	-1.4%	0.4%	0.2%
Asian alone, NH	409	431	464	499	526	542	555	564	564	155	0.8%	3.2%	3.4%
Native Hawaiian and Other Pacific Islander alone, NH	12	12	12	12	12	12	12	12	11	-1	-0.2%	0.1%	0.1%
American Indian and Alaska Native alone, NH	47	47	45	43	41	38	35	31	29	-18	-1.3%	0.4%	0.2%
Some Other Race alone, NH	89	96	107	119	132	135	138	144	144	55	1.3%	0.7%	0.9%
Two or more races, NH	442	458	473	494	510	527	535	526	517	74	0.4%	3.5%	3.1%

Mendota and SOI

Table 52 – Population Projection for Mendota SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	12,500	12,500	0	2,851	4.38
2025	12,530	12,530	0	2,909	4.34
2030	13,070	13,070	0	3,045	4.33
2035	13,400	13,400	0	3,121	4.31
2040	13,710	13,710	0	3,173	4.33
2045	13,980	13,980	0	3,225	4.35
2050	14,170	14,170	0	3,267	4.35
2055	14,240	14,240	0	3,295	4.33
2060	14,210	14,210	0	3,288	4.32
2022-2060 change	1,710	1,710	0	437	
2022-2060 annual growth rate	0.34%	0.34%	-	0.38%	

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CONT

Table 53 – Job Projection for Mendota SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	330	330	350	370	380	400	420	440	460
Retail	180	180	190	200	210	220	220	230	240
Office	30	10	50	70	90	100	90	90	70
Education	450	450	480	500	520	540	560	570	580
Health/Medical	180	180	190	190	200	210	210	220	220
Services	10	10	10	10	10	10	10	10	10
Food	130	130	140	140	150	150	160	160	170
Other	70	70	70	70	70	70	70	80	80
Government	450	460	480	500	520	540	560	580	600
Total	**1,830**	**1,820**	**1,960**	**2,060**	**2,160**	**2,250**	**2,330**	**2,390**	**2,430**

Table 54 – Housing Unit Projection for Mendota SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	880	809	71
2022-2030	1,049	964	85
2022-2035	1,144	1,041	103
2022-2040	1,209	1,090	119
2022-2045	1,274	1,135	139
2022-2050	1,326	1,172	154
2022-2055	1,361	1,196	165
2022-2060	1,351	1,189	162

Table 55 – Population Projection for Mendota SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	12,497	12,529	13,069	13,396	13,712	13,984	14,166	14,239	14,206	1,709	0.3%	100.0%	100.0%
5 and below	1,285	1,092	1,116	1,191	1,250	1,237	1,160	1,086	1,065	-220	-0.5%	10.3%	7.5%
6 to 14	2,276	2,186	1,840	1,571	1,665	1,773	1,818	1,755	1,703	-572	-0.8%	18.2%	12.0%
15 to 19	1,123	1,172	1,230	1,121	828	873	939	989	991	-132	-0.3%	9.0%	7.0%
20 to 24	1,073	1,106	1,160	1,197	1,092	810	855	921	945	-128	-0.3%	8.6%	6.7%
25 to 34	1,883	1,824	2,024	2,188	2,259	2,200	1,834	1,613	1,648	-235	-0.4%	15.1%	11.6%
35 to 44	1,655	1,710	1,751	1,741	1,901	2,063	2,145	2,096	1,930	275	0.4%	13.2%	13.6%
45 to 54	1,269	1,345	1,511	1,614	1,625	1,623	1,784	1,943	1,959	690	1.1%	10.2%	13.8%
55 to 64	1,020	1,042	1,099	1,226	1,355	1,453	1,472	1,475	1,578	557	1.2%	8.2%	11.1%
65 to 74	591	674	836	887	923	1,036	1,151	1,240	1,210	619	1.9%	4.7%	8.5%
75 and above	322	377	501	659	813	916	1,007	1,122	1,176	855	3.47%	2.57%	8.28%

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Table 56 – Population Projection for Mendota SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	12,497	12,529	13,069	13,396	13,712	13,984	14,166	14,239	14,206	1,709	0.3%	100.0%	100.0%
White alone, NH	294	285	284	286	298	312	321	322	318	25	0.2%	2.4%	2.2%
Hispanic or Latino	12,079	12,126	12,671	13,002	13,313	13,577	13,758	13,838	13,810	1,731	0.4%	96.7%	97.2%
Black or African American alone, NH	5	5	5	5	5	5	5	4	4	-1	-0.7%	0.0%	0.0%
Asian alone, NH	14	13	13	12	10	9	8	7	6	-8	-2.0%	0.1%	0.0%
Native Hawaiian and Other Pacific Islander alone, NH	1	1	1	1	1	1	1	1	1	0	-0.4%	0.0%	0.0%
American Indian and Alaska Native alone, NH	22	20	19	17	15	13	11	10	9	-12	-2.2%	0.2%	0.1%
Some Other Race alone, NH	37	36	35	34	32	31	29	27	26	-11	-1.0%	0.3%	0.2%
Two or more races, NH	44	43	42	40	38	36	34	31	30	-14	-1.0%	0.4%	0.2%

Orange Cove and SOI

Table 57 – Population Projection for Orange Cove SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	9,590	9,590	0	2,439	3.93
2025	9,600	9,600	0	2,480	3.89
2030	9,670	9,670	0	2,506	3.87
2035	9,780	9,780	0	2,535	3.87
2040	9,890	9,890	0	2,546	3.89
2045	9,990	9,990	0	2,562	3.90
2050	10,050	10,050	0	2,578	3.90
2055	10,070	10,070	0	2,593	3.89
2060	10,060	10,060	0	2,590	3.88
2022-2060 change	470	470	0	151	
2022-2060 annual growth rate	0.13%	0.13%	-	0.16%	

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CONT

Table 58 – Job Projection for Orange Cove SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	50	50	50	60	60	60	60	70	70
Retail	130	130	130	140	140	140	150	150	150
Office	30	30	30	30	40	50	50	60	60
Education	220	220	230	230	240	250	250	250	250
Health/Medical	290	290	300	310	310	320	320	320	330
Services	0	0	0	0	0	0	0	0	0
Food	20	20	20	30	30	30	30	30	30
Other	120	120	120	120	120	130	130	130	130
Government	100	100	100	100	110	110	110	110	110
Total	**960**	**970**	**990**	**1,020**	**1,050**	**1,080**	**1,100**	**1,120**	**1,130**

Table 59 – Housing Unit Projection for Orange Cove SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	447	250	197
2022-2030	479	268	211
2022-2035	512	289	224
2022-2040	525	297	228
2022-2045	543	309	234
2022-2050	562	322	240
2022-2055	580	334	246
2022-2060	576	332	245

Table 60 – Population Projection for Orange Cove SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	9,589	9,601	9,672	9,784	9,892	9,985	10,047	10,073	10,061	472	0.1%	100.0%	100.0%
5 and below	900	835	886	928	918	860	802	770	765	-135	-0.4%	9.4%	7.6%
6 to 14	1,695	1,516	1,265	1,207	1,290	1,327	1,289	1,209	1,178	-517	-1.0%	17.7%	11.7%
15 to 19	986	997	843	709	618	674	715	712	697	-289	-0.9%	10.3%	6.9%
20 to 24	849	900	951	808	684	600	658	700	704	-144	-0.5%	8.8%	7.0%
25 to 34	1,277	1,392	1,555	1,731	1,653	1,416	1,231	1,214	1,255	-22	0.0%	13.3%	12.5%
35 to 44	1,183	1,129	1,150	1,262	1,425	1,605	1,553	1,340	1,256	73	0.2%	12.3%	12.5%
45 to 54	974	1,006	1,053	1,012	1,042	1,158	1,325	1,502	1,499	525	1.1%	10.2%	14.9%
55 to 64	812	849	841	873	922	896	936	1,047	1,094	282	0.8%	8.5%	10.9%
65 to 74	551	596	660	690	691	728	777	759	767	216	0.9%	5.7%	7.6%
75 and above	364	382	467	563	651	721	761	819	847	483	2.25%	3.80%	8.42%

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CONT

Table 61 – Population Projection for Orange Cove SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	9,589	9,601	9,672	9,784	9,892	9,985	10,047	10,073	10,061	472	0.1%	100.0%	100.0%
White alone, NH	323	309	290	275	261	245	233	224	220	-103	-1.0%	3.4%	2.2%
Hispanic or Latino	9,112	9,147	9,253	9,394	9,531	9,652	9,737	9,781	9,776	664	0.2%	95.0%	97.2%
Black or African American alone, NH	23	21	17	14	11	10	8	6	6	-17	-3.5%	0.2%	0.1%
Asian alone, NH	62	58	51	43	37	32	27	24	23	-39	-2.6%	0.6%	0.2%
Native Hawaiian and Other Pacific Islander alone, NH	5	4	4	4	3	3	3	3	3	-2	-1.6%	0.0%	0.0%
American Indian and Alaska Native alone, NH	12	11	10	9	8	7	6	6	5	-6	-2.1%	0.1%	0.1%
Some Other Race alone, NH	4	4	3	3	3	3	2	2	2	-2	-2.3%	0.0%	0.0%
Two or more races, NH	49	47	44	41	37	34	31	28	27	-22	-1.6%	0.5%	0.3%

Parlier and SOI

Table 62 – Population Projection for Parlier SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	15,030	15,030	0	3,768	3.99
2025	15,040	15,040	0	3,825	3.95
2030	15,060	15,060	0	3,844	3.92
2035	15,200	15,200	0	3,879	3.93
2040	15,340	15,340	0	3,888	3.95
2045	15,450	15,450	0	3,904	3.96
2050	15,530	15,530	0	3,924	3.96
2055	15,560	15,560	0	3,945	3.95
2060	15,550	15,550	0	3,941	3.94
2022-2060 change	520	520	0	173	
2022-2060 annual growth rate	0.09%	0.09%	-	0.12%	

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CONT

Table 63 – Job Projection for Parlier SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	760	760	800	830	880	920	960	1,000	1,050
Retail	180	180	180	180	190	190	200	200	200
Office	130	100	90	110	130	150	160	180	190
Education	480	480	490	510	520	530	530	540	540
Health/Medical	390	390	400	400	410	420	420	420	420
Services	50	50	50	50	60	60	60	60	60
Food	120	120	120	120	120	130	130	130	130
Other	320	330	340	340	340	350	350	360	360
Government	140	140	140	150	150	150	150	160	160
Total	**2,550**	**2,540**	**2,610**	**2,700**	**2,790**	**2,880**	**2,970**	**3,040**	**3,100**

Table 64 – Housing Unit Projection for Parlier SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	511	400	112
2022-2030	533	417	116
2022-2035	575	448	127
2022-2040	585	455	130
2022-2045	604	468	135
2022-2050	627	485	142
2022-2055	652	502	149
2022-2060	647	499	148

Table 65 – Population Projection for Parlier SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	15,029	15,038	15,062	15,202	15,337	15,454	15,532	15,563	15,549	520	0.1%	100.0%	100.0%
5 and below	1,359	1,291	1,319	1,357	1,356	1,292	1,222	1,179	1,174	-184	-0.4%	9.0%	7.6%
6 to 14	2,554	2,334	1,907	1,839	1,911	1,959	1,926	1,835	1,796	-758	-0.9%	17.0%	11.6%
15 to 19	1,494	1,432	1,341	1,051	959	1,010	1,056	1,064	1,047	-447	-0.9%	9.9%	6.7%
20 to 24	1,152	1,327	1,364	1,290	1,016	934	989	1,036	1,045	-107	-0.3%	7.7%	6.7%
25 to 34	2,089	2,165	2,303	2,520	2,507	2,197	1,878	1,863	1,903	-186	-0.2%	13.9%	12.2%
35 to 44	2,006	1,884	1,869	1,965	2,123	2,351	2,369	2,091	1,969	-38	0.0%	13.3%	12.7%
45 to 54	1,630	1,620	1,749	1,691	1,704	1,814	1,984	2,214	2,251	621	0.9%	10.8%	14.5%
55 to 64	1,381	1,453	1,378	1,406	1,541	1,506	1,539	1,649	1,682	301	0.5%	9.2%	10.8%
65 to 74	854	952	1,080	1,180	1,138	1,179	1,306	1,283	1,304	450	1.1%	5.7%	8.4%
75 and above	510	579	753	903	1,082	1,212	1,263	1,350	1,378	867	2.65%	3.39%	8.86%

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CONT

Table 66 – Population Projection for Parlier SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	15,029	15,038	15,062	15,202	15,337	15,454	15,532	15,563	15,549	520	0.1%	100.0%	100.0%
White alone, NH	210	204	196	189	182	176	170	165	163	-47	-0.7%	1.4%	1.1%
Hispanic or Latino	14,675	14,701	14,748	14,908	15,063	15,195	15,286	15,329	15,320	644	0.1%	97.6%	98.5%
Black or African American alone, NH	33	31	27	24	22	20	19	17	17	-16	-1.8%	0.2%	0.1%
Asian alone, NH	47	43	37	32	28	24	22	19	18	-29	-2.5%	0.3%	0.1%
Native Hawaiian and Other Pacific Islander alone, NH	2	2	2	2	1	1	1	1	1	-1	-2.0%	0.0%	0.0%
American Indian and Alaska Native alone, NH	9	9	7	6	6	5	4	3	3	-6	-2.7%	0.1%	0.0%
Some Other Race alone, NH	14	13	12	11	10	9	8	8	7	-7	-1.7%	0.1%	0.0%
Two or more races, NH	39	37	32	29	26	23	21	20	19	-19	-1.8%	0.3%	0.1%

Reedley and SOI

Table 67 – Population Projection for Reedley SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	25,290	25,050	240	7,244	3.46
2025	25,830	25,580	250	7,506	3.45
2030	25,900	25,640	260	7,549	3.40
2035	26,740	26,470	270	7,793	3.42
2040	27,550	27,270	280	7,976	3.43
2045	28,250	27,960	290	8,150	3.45
2050	28,710	28,420	290	8,285	3.44
2055	28,900	28,610	290	8,368	3.43
2060	28,820	28,520	300	8,343	3.42
2022-2060 change	3,530	3,480	50	1,099	
2022-2060 annual growth rate	0.34%	0.34%	0.59%	0.37%	

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CONT

Table 68 – Job Projection for Reedley SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	950	940	990	1,040	1,090	1,140	1,190	1,250	1,310
Retail	500	510	520	540	560	570	590	600	600
Office	260	420	300	350	410	450	480	490	490
Education	1,620	1,650	1,700	1,760	1,820	1,870	1,920	1,940	1,960
Health/Medical	1,900	1,920	1,970	2,020	2,080	2,130	2,170	2,200	2,220
Services	150	150	160	170	180	190	190	200	200
Food	510	520	530	550	570	580	600	610	620
Other	2,010	2,070	2,080	2,110	2,130	2,160	2,190	2,220	2,250
Government	240	240	250	260	270	270	280	290	290
Total	**8,120**	**8,400**	**8,520**	**8,800**	**9,100**	**9,370**	**9,610**	**9,800**	**9,940**

Table 69 – Housing Unit Projection for Reedley SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	1,043	772	271
2022-2030	1,092	808	284
2022-2035	1,366	966	401
2022-2040	1,573	1,067	506
2022-2045	1,769	1,155	615
2022-2050	1,921	1,223	698
2022-2055	2,014	1,262	752
2022-2060	1,985	1,250	735

Table 70 – Population Projection for Reedley SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	25,293	25,831	25,902	26,739	27,551	28,248	28,715	28,904	28,817	3,524	0.3%	100.0%	100.0%
5 and below	1,929	2,030	2,159	2,318	2,362	2,277	2,164	2,114	2,117	188	0.2%	7.6%	7.3%
6 to 14	3,790	3,388	2,895	3,087	3,362	3,532	3,498	3,318	3,231	-560	-0.4%	15.0%	11.2%
15 to 19	2,222	2,270	2,026	1,585	1,651	1,819	1,952	1,968	1,928	-294	-0.4%	8.8%	6.7%
20 to 24	2,000	2,170	2,202	2,020	1,583	1,653	1,819	1,940	1,955	-45	-0.1%	7.9%	6.8%
25 to 34	3,366	3,599	3,942	4,279	4,195	3,592	3,227	3,439	3,539	173	0.1%	13.3%	12.3%
35 to 44	3,064	3,070	3,187	3,448	3,887	4,238	4,160	3,536	3,364	300	0.2%	12.1%	11.7%
45 to 54	2,833	2,925	2,868	2,907	3,107	3,376	3,810	4,124	4,070	1,237	1.0%	11.2%	14.1%
55 to 64	2,592	2,681	2,666	2,678	2,700	2,748	2,940	3,174	3,314	722	0.6%	10.2%	11.5%
65 to 74	1,820	1,968	2,115	2,302	2,353	2,380	2,397	2,421	2,414	594	0.7%	7.2%	8.4%
75 and above	1,676	1,730	1,841	2,115	2,352	2,633	2,747	2,868	2,885	1,209	1.44%	6.63%	10.01%

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CONT

Table 71 – Population Projection for Reedley SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	25,293	25,831	25,902	26,739	27,551	28,248	28,715	28,904	28,817	3,524	0.3%	100.0%	100.0%
White alone, NH	3,846	3,678	3,340	3,155	2,998	2,859	2,734	2,614	2,561	-1,286	-1.1%	15.2%	8.9%
Hispanic or Latino	20,129	20,830	21,277	22,305	23,283	24,128	24,743	25,082	25,066	4,937	0.6%	79.6%	87.0%
Black or African American alone, NH	73	76	79	76	71	66	61	66	67	-6	-0.2%	0.3%	0.2%
Asian alone, NH	653	645	610	593	573	551	524	505	496	-157	-0.7%	2.6%	1.7%
Native Hawaiian and Other Pacific Islander alone, NH	4	4	3	3	2	2	1	1	1	-3	-4.2%	0.0%	0.0%
American Indian and Alaska Native alone, NH	45	45	43	42	40	38	36	33	32	-14	-0.9%	0.2%	0.1%
Some Other Race alone, NH	172	176	176	187	202	216	229	230	228	56	0.7%	0.7%	0.8%
Two or more races, NH	370	377	373	378	383	387	386	374	367	-4	0.0%	1.5%	1.3%

Sanger and SOI

Table 72 – Population Projection for Sanger SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	27,040	26,890	150	7,815	3.44
2025	27,040	26,890	150	7,962	3.40
2030	27,540	27,380	160	8,133	3.38
2035	27,940	27,780	160	8,252	3.38
2040	28,330	28,170	160	8,312	3.39
2045	28,670	28,510	160	8,382	3.41
2050	28,900	28,730	170	8,448	3.41
2055	28,990	28,820	170	8,503	3.39
2060	28,940	28,780	160	8,491	3.39
2022-2060 change	1,900	1,890	10	676	
2022-2060 annual growth rate	0.18%	0.18%	0.17%	0.22%	

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Table 73 – Job Projection for Sanger SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	2,730	2,710	2,850	2,990	3,140	3,290	3,440	3,590	3,760
Retail	750	750	770	780	800	810	820	820	820
Office	1,720	1,600	1,680	1,750	1,820	1,880	1,940	1,990	2,030
Education	1,100	1,110	1,130	1,160	1,180	1,200	1,210	1,210	1,210
Health/Medical	980	990	1,000	1,010	1,030	1,040	1,050	1,050	1,040
Services	140	140	140	150	160	160	170	170	170
Food	690	690	700	720	730	740	750	760	750
Other	950	980	990	1,000	1,010	1,030	1,040	1,060	1,070
Government	750	760	770	780	800	810	820	830	830
Total	**9,800**	**9,720**	**10,050**	**10,340**	**10,660**	**10,960**	**11,240**	**11,480**	**11,700**

Table 74 – Housing Unit Projection for Sanger SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	1,023	702	321
2022-2030	1,216	835	381
2022-2035	1,351	933	418
2022-2040	1,418	984	435
2022-2045	1,498	1,045	453
2022-2050	1,573	1,102	470
2022-2055	1,635	1,150	485
2022-2060	1,621	1,139	481

Table 75 – Population Projection for Sanger SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	27,039	27,044	27,538	27,941	28,334	28,670	28,895	28,986	28,944	1,906	0.2%	100.0%	100.0%
5 and below	2,131	2,168	2,304	2,432	2,450	2,328	2,189	2,125	2,124	-7	0.0%	7.9%	7.3%
6 to 14	4,183	3,679	3,193	3,261	3,451	3,595	3,540	3,339	3,257	-926	-0.7%	15.5%	11.3%
15 to 19	2,430	2,432	2,171	1,720	1,730	1,835	1,958	1,982	1,944	-486	-0.6%	9.0%	6.7%
20 to 24	1,976	2,203	2,379	2,118	1,684	1,705	1,814	1,936	1,958	-18	0.0%	7.3%	6.8%
25 to 34	3,800	3,589	3,972	4,412	4,336	3,693	3,317	3,451	3,534	-265	-0.2%	14.1%	12.2%
35 to 44	3,612	3,768	3,577	3,396	3,763	4,222	4,188	3,578	3,385	-227	-0.2%	13.4%	11.7%
45 to 54	3,061	3,153	3,329	3,523	3,347	3,211	3,594	4,046	4,102	1,041	0.8%	11.3%	14.2%
55 to 64	2,589	2,532	2,675	2,851	3,013	3,218	3,082	2,971	3,074	485	0.5%	9.6%	10.6%
65 to 74	1,878	2,004	2,134	2,144	2,270	2,446	2,609	2,791	2,698	821	1.0%	6.9%	9.3%
75 and above	1,379	1,517	1,804	2,085	2,290	2,418	2,603	2,768	2,867	1,488	1.94%	5.10%	9.91%

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CONT

Table 76 – Population Projection for Sanger SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	27,039	27,044	27,538	27,941	28,334	28,670	28,895	28,986	28,944	1,906	0.2%	100.0%	100.0%
White alone, NH	3,200	3,092	2,962	2,823	2,704	2,603	2,507	2,413	2,372	-828	-0.8%	11.8%	8.2%
Hispanic or Latino	22,370	22,506	23,141	23,698	24,216	24,663	25,002	25,220	25,236	2,866	0.3%	82.7%	87.2%
Black or African American alone, NH	174	170	169	167	165	164	163	162	160	-14	-0.2%	0.6%	0.6%
Asian alone, NH	776	771	769	761	762	765	769	761	755	-22	-0.1%	2.9%	2.6%
Native Hawaiian and Other Pacific Islander alone, NH	29	27	25	23	21	19	16	14	13	-16	-2.1%	0.1%	0.0%
American Indian and Alaska Native alone, NH	76	72	68	63	58	54	49	44	42	-34	-1.6%	0.3%	0.1%
Some Other Race alone, NH	82	79	81	86	90	93	88	83	81	-1	0.0%	0.3%	0.3%
Two or more races, NH	333	327	323	321	316	309	301	291	286	-47	-0.4%	1.2%	1.0%

San Joaquin and SOI

Table 77 – Population Projection for San Joaquin SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	3,670	3,670	0	902	4.07
2025	3,610	3,610	0	913	3.97
2030	3,640	3,640	0	922	3.96
2035	3,670	3,670	0	929	3.95
2040	3,700	3,700	0	930	3.98
2045	3,720	3,720	0	934	3.99
2050	3,740	3,740	0	938	3.99
2055	3,750	3,750	0	943	3.98
2060	3,740	3,740	0	942	3.97
2022-2060 change	70	70	0	39	
2022-2060 annual growth rate	0.05%	0.05%	-	0.11%	

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CONT

Table 78 – Job Projection for San Joaquin SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	50	50	60	60	60	70	70	70	70
Retail	40	40	40	40	40	40	40	40	40
Office	40	20	30	30	30	40	50	50	60
Education	120	120	120	120	120	120	120	120	120
Health/Medical	320	320	320	320	320	320	320	320	310
Services	30	30	30	30	30	30	30	30	30
Food	10	10	10	10	10	10	10	10	10
Other	20	20	20	20	20	20	20	20	20
Government	30	30	30	30	30	30	30	30	30
Total	**650**	**630**	**640**	**650**	**660**	**670**	**680**	**690**	**690**

Table 79 – Housing Unit Projection for San Joaquin SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	182	182	-
2022-2030	193	193	-
2022-2035	202	199	3
2022-2040	203	200	3
2022-2045	207	202	5
2022-2050	212	204	8
2022-2055	218	207	11
2022-2060	217	206	11

Table 80 – Population Projection for San Joaquin SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	3,668	3,615	3,638	3,668	3,698	3,723	3,739	3,746	3,743	75	0.1%	100.0%	100.0%
5 and below	316	289	337	368	362	329	294	289	292	-24	-0.2%	8.6%	7.8%
6 to 14	659	579	450	443	496	520	499	453	434	-225	-1.1%	18.0%	11.6%
15 to 19	409	364	327	247	219	253	281	278	271	-138	-1.1%	11.2%	7.2%
20 to 24	336	391	346	310	237	212	247	275	278	-58	-0.5%	9.2%	7.4%
25 to 34	470	498	628	679	609	515	429	443	468	-3	0.0%	12.8%	12.5%
35 to 44	393	387	401	446	566	623	571	487	441	47	0.3%	10.7%	11.8%
45 to 54	447	405	366	343	358	404	524	582	580	133	0.7%	12.2%	15.5%
55 to 64	317	357	367	346	315	301	320	365	400	83	0.6%	8.6%	10.7%
65 to 74	217	223	242	286	296	285	264	256	262	45	0.5%	5.9%	7.0%
75 and above	103	122	175	201	241	280	309	320	318	215	3.00%	2.82%	8.50%

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CONT

Table 81 – Population Projection for San Joaquin SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	3,668	3,615	3,638	3,668	3,698	3,723	3,739	3,746	3,743	75	0.1%	100.0%	100.0%
White alone, NH	87	86	88	90	84	78	73	73	75	-12	-0.4%	2.4%	2.0%
Hispanic or Latino	3,511	3,462	3,489	3,522	3,561	3,596	3,622	3,633	3,630	119	0.1%	95.7%	97.0%
Black or African American alone, NH	30	28	26	24	23	21	20	19	18	-12	-1.3%	0.8%	0.5%
Asian alone, NH	7	7	6	5	5	4	3	2	2	-5	-3.3%	0.2%	0.1%
Native Hawaiian and Other Pacific Islander alone, NH	1	1	1	1	1	0	0	0	0	-1	-4.0%	0.0%	0.0%
American Indian and Alaska Native alone, NH	5	5	4	4	3	3	2	2	1	-3	-3.1%	0.1%	0.0%
Some Other Race alone, NH	19	18	17	16	15	14	13	12	11	-8	-1.4%	0.5%	0.3%
Two or more races, NH	8	7	7	7	6	6	6	5	5	-2	-1.0%	0.2%	0.1%

Selma and SOI

Table 82 – Population Projection for Selma SOI, 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	26,540	26,350	190	7,614	3.46
2025	26,650	26,460	190	7,809	3.42
2030	28,250	28,030	220	8,303	3.42
2035	29,150	28,930	220	8,569	3.40
2040	30,030	29,800	230	8,768	3.41
2045	30,790	30,550	240	8,958	3.43
2050	31,290	31,050	240	9,104	3.42
2055	31,490	31,260	230	9,195	3.41
2060	31,400	31,160	240	9,167	3.40
2022-2060 change	4,860	4,820	40	1,553	
2022-2060 annual growth rate	0.44%	0.44%	0.62%	0.49%	

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Table 83 – Job Projection for Selma SOI by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	1,260	1,250	1,320	1,380	1,450	1,520	1,590	1,660	1,740
Retail	1,780	1,820	2,390	2,770	2,840	2,920	2,990	3,040	3,090
Office	300	350	540	570	610	620	610	580	530
Education	800	820	850	890	920	960	990	1,010	1,020
Health/Medical	1,010	1,030	1,060	1,100	1,130	1,170	1,200	1,230	1,250
Services	150	160	170	230	240	250	260	270	270
Food	850	870	900	1,090	1,130	1,160	1,190	1,220	1,240
Other	2,880	4,960	4,990	3,020	3,050	3,100	3,140	3,190	3,230
Government	250	260	270	280	290	300	310	320	330
Total	**9,280**	**11,510**	**12,490**	**11,320**	**11,670**	**12,000**	**12,290**	**12,520**	**12,710**

Table 84 – Housing Unit Projection for Selma SOI, 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	852	787	64
2022-2030	1,401	1,296	105
2022-2035	1,697	1,581	117
2022-2040	1,919	1,798	121
2022-2045	2,130	2,008	123
2022-2050	2,294	2,169	124
2022-2055	2,394	2,269	125
2022-2060	2,364	2,239	125

Table 85 – Population Projection for Selma SOI by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	26,541	26,651	28,248	29,153	30,032	30,785	31,290	31,495	31,401	4,860	0.4%	100.0%	100.0%
5 and below	2,194	2,137	2,370	2,507	2,557	2,496	2,402	2,344	2,336	141	0.2%	8.3%	7.4%
6 to 14	3,932	3,669	3,355	3,415	3,660	3,817	3,801	3,649	3,569	-363	-0.3%	14.8%	11.4%
15 to 19	2,214	2,220	2,199	1,886	1,840	1,990	2,104	2,125	2,090	-124	-0.2%	8.3%	6.7%
20 to 24	2,091	2,138	2,264	2,189	1,883	1,841	1,986	2,087	2,103	12	0.0%	7.9%	6.7%
25 to 34	3,726	3,710	4,105	4,412	4,422	4,057	3,706	3,782	3,859	133	0.1%	14.0%	12.3%
35 to 44	3,355	3,477	3,686	3,734	4,044	4,366	4,375	3,981	3,779	424	0.3%	12.6%	12.0%
45 to 54	2,924	2,925	3,244	3,459	3,586	3,652	3,956	4,235	4,206	1,282	1.0%	11.0%	13.4%
55 to 64	2,682	2,693	2,668	2,815	3,053	3,270	3,384	3,421	3,524	842	0.7%	10.1%	11.2%
65 to 74	1,986	2,049	2,319	2,426	2,355	2,501	2,710	2,874	2,887	901	1.0%	7.5%	9.2%
75 and above	1,438	1,633	2,038	2,309	2,632	2,795	2,866	2,996	3,048	1,610	2.00%	5.42%	9.71%

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CONT

Table 86 – Population Projection for Selma SOI by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	26,541	26,651	28,248	29,153	30,032	30,785	31,290	31,495	31,401	4,860	0.4%	100.0%	100.0%
White alone, NH	2,964	2,820	2,726	2,564	2,425	2,306	2,195	2,086	2,038	-926	-1.0%	11.2%	6.5%
Hispanic or Latino	21,638	21,909	23,539	24,609	25,644	26,548	27,204	27,571	27,553	5,915	0.6%	81.5%	87.7%
Black or African American alone, NH	156	152	153	151	150	149	149	149	148	-8	-0.1%	0.6%	0.5%
Asian alone, NH	1,132	1,125	1,165	1,166	1,154	1,131	1,107	1,080	1,066	-66	-0.2%	4.3%	3.4%
Native Hawaiian and Other Pacific Islander alone, NH	6	6	6	6	6	5	5	4	4	-2	-1.1%	0.0%	0.0%
American Indian and Alaska Native alone, NH	96	92	88	82	75	69	62	55	52	-45	-1.6%	0.4%	0.2%
Some Other Race alone, NH	132	132	139	142	144	146	148	148	148	16	0.3%	0.5%	0.5%
Two or more races, NH	417	415	431	434	434	431	421	401	392	-25	-0.2%	1.6%	1.2%

Unincorporated Areas (excl. SOIs)

Table 87 – Population Projection for Unincorporated Areas (excl. SOIs) , 2022-2060

Year	Total Population	Household Population	Group Quarter Population	Number of Households	Average Household Size
2022	102,880	100,970	1,910	33,951	2.98
2025	103,050	101,130	1,920	33,938	2.98
2030	103,280	101,300	1,980	33,992	2.98
2035	104,290	102,280	2,010	34,324	2.99
2040	105,280	103,250	2,030	34,414	3.00
2045	106,120	104,070	2,050	34,573	3.01
2050	106,680	104,620	2,060	34,756	3.01
2055	106,910	104,850	2,060	34,947	3.00
2060	106,800	104,740	2,060	34,913	3.00
2022-2060 change	3,920	3,770	150	962	
2022-2060 annual growth rate	0.10%	0.10%	0.20%	0.07%	

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Table 88 – Job Projection for Unincorporated Areas (excl. SOIs) by Sector, 2022-2060

Job Sector	2022	2025	2030	2035	2040	2045	2050	2055	2060
Industrial	12,460	12,380	13,040	13,660	14,360	15,020	15,710	16,420	17,190
Retail	1,130	1,130	1,130	1,120	1,110	1,090	1,050	1,000	930
Office	2,660	4,010	3,870	3,980	4,100	4,250	4,340	4,380	4,390
Education	2,720	2,740	2,820	2,870	2,930	2,970	2,990	2,970	2,930
Health/Medical	1,600	1,740	1,960	2,190	2,410	2,630	2,830	3,010	3,170
Services	1,930	1,990	2,130	2,270	2,430	2,560	2,670	2,750	2,790
Food	1,330	1,350	1,380	1,420	1,440	1,460	1,470	1,470	1,450
Other	34,300	35,300	35,600	36,010	36,420	36,980	37,490	38,000	38,510
Government	790	850	950	1,050	1,160	1,260	1,360	1,450	1,530
Total	**58,920**	**61,480**	**62,890**	**64,580**	**66,360**	**68,210**	**69,910**	**71,450**	**72,900**

Table 89 – Housing Unit Projection for Unincorporated Areas (excl. SOIs), 2022-2060

Periods	New Units Demand	Single-family Housing Units	Multi-family Housing Units
2022-2025	1,715	1,604	111
2022-2030	1,779	1,663	116
2022-2035	2,165	2,029	135
2022-2040	2,270	2,130	140
2022-2045	2,455	2,307	148
2022-2050	2,669	2,512	157
2022-2055	2,892	2,726	166
2022-2060	2,852	2,688	164

Table 90 – Population Projection for Unincorporated Areas (excl. SOIs) by Age, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Age Group	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	102,882	103,050	103,285	104,295	105,275	106,116	106,679	106,907	106,803	3,921	0.1%	100.0%	100.0%
5 and below	6,340	6,185	6,949	7,874	8,375	8,153	7,685	7,480	7,498	1,158	0.4%	6.2%	7.0%
6 to 14	12,831	11,449	9,894	10,062	11,347	12,476	12,706	12,092	11,780	-1,052	-0.2%	12.5%	11.0%
15 to 19	8,176	8,116	6,852	5,793	5,435	6,132	6,899	7,252	7,175	-1,001	-0.3%	7.9%	6.7%
20 to 24	6,396	7,752	8,128	6,923	5,865	5,510	6,220	6,955	7,141	745	0.3%	6.2%	6.7%
25 to 34	10,369	10,828	13,414	15,933	15,173	12,976	11,593	11,890	12,375	2,007	0.5%	10.1%	11.6%
35 to 44	11,331	11,022	10,648	11,079	13,536	16,014	15,339	13,133	12,432	1,101	0.2%	11.0%	11.6%
45 to 54	11,721	11,436	11,219	10,835	10,656	11,146	13,547	15,890	15,834	4,112	0.8%	11.4%	14.8%
55 to 64	14,584	13,178	11,150	10,644	10,556	10,316	10,312	10,789	11,438	-3,146	-0.6%	14.2%	10.7%
65 to 74	12,156	12,941	13,059	11,443	9,770	9,364	9,363	9,208	9,133	-3,023	-0.7%	11.8%	8.6%
75 and above	8,977	10,144	11,971	13,709	14,562	14,029	13,015	12,218	11,997	3,020	0.77%	8.73%	11.23%

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CONT

Table 91 – Population Projection for Unincorporated Areas (excl. SOIs) by Race and Ethnicity, 2022-2060

	Year									22-60 Change	Annual growth rate	2022 share	2060 share
Race/Ethnicity	2022	2025	2030	2035	2040	2045	2050	2055	2060				
Total	102,881	103,050	103,285	104,295	105,275	106,116	106,679	106,907	106,803	3,921	0.1%	100.0%	100.0%
White alone, NH	37,641	35,625	31,670	28,116	24,724	21,640	19,002	16,884	16,250	-21,391	-2.2%	36.6%	15.2%
Hispanic or Latino	51,927	53,804	57,695	62,111	66,444	70,306	73,384	75,632	76,182	24,255	1.0%	50.5%	71.3%
Black or African American alone, NH	1,433	1,564	1,798	1,947	2,060	2,181	2,314	2,407	2,421	988	1.4%	1.4%	2.3%
Asian alone, NH	7,320	7,527	7,704	7,819	7,856	7,906	8,001	8,122	8,147	827	0.3%	7.1%	7.6%
Native Hawaiian and Other Pacific Islander alone, NH	74	76	79	84	90	98	107	116	118	44	1.2%	0.1%	0.1%
American Indian and Alaska Native alone, NH	878	887	892	900	921	940	956	959	954	76	0.2%	0.9%	0.9%
Some Other Race alone, NH	572	578	587	575	562	565	573	576	574	2	0.0%	0.6%	0.5%
Two or more races, NH	3,036	2,989	2,858	2,744	2,618	2,480	2,343	2,210	2,156	-880	-0.9%	3.0%	2.0%

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SUBJECT: Draft Program Environmental Impact Report for the Proposed Southeast Development Area Specific Plan Project (State Clearinghouse No. 2022020486)

This comment letter is being submitted on behalf of our client, the County of Fresno (the "County") Department of Public Works and Planning regarding the City of Fresno's (the "City") Draft Environmental Impact Report ("DEIR") for the Southeast Development Area Specific Plan Project (the "Specific Plan"), which is intended to govern future development of the area commonly referred to as SEDA (the "Project"). Please ensure this letter and its referenced enclosures are included in the Record of Proceedings regarding the consideration of the Project by the City of Fresno (the "City").[1] 43 CONT

A. <u>The Specific Plan Fails to Address the Requirements of LAFCO Resolution USOI-144, and Thereby Omits Discussion of Important Policies Intended to Mitigate the Environmental Consequences of the Project</u>.

Preparation of the Specific Plan for SEDA development is a requirement of the Fresno County LAFCO approval that incorporated SEDA into the City Sphere of Influence, as set forth in LAFCO Resolution USOI-144, a copy of which is attached for convenience of reference. Therefore, the City needs to assure that the Specific Plan incorporates the details intended by Resolution USOI-144. Those elements require a master service delivery plan, and an implementation program for annexing open space areas and rural residential neighborhoods. These items were highlighted in Resolution USOI-144 because they involve significant environmental impacts of the intended development of SEDA. However, those requirements have not been adequately

[1] This letter is being submitted after the 45 day comment period based upon arrangements previously confirmed between the City and the County.

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addressed in the Specific Plan. As a result, its companion DEIR fails to adequately evaluate how the Specific Plan's implementation will mitigate the environmental impacts that would be addressed by the intended requirements of Resolution USOI-144.

Resolution USOI-144 does not simply require that those intended programs apply to properties within the boundaries of SEDA. Resolution USOI-144 requires development of a program that addresses annexing rural residential neighborhoods within the City's existing sphere of influence in the vicinity of SEDA, as well as within SEDA. That program, as specified in the Resolution, must address "logical and reasonable development, discourage urban sprawl, preserve open-space and prime agricultural lands, and efficiently provide for government services and encourage orderly development."

Additionally, the intended rural residential neighborhood annexation program is required to "emphasize the retention of characteristics that make the neighborhoods desirable places to live, while making provision for appropriate improvement needed to incorporate characteristics into the urban landscape." These are not programs or policies that were to be deferred to some subsequent time, or to some subsequent SEDA Development Code amendments. Resolution USOI-144 specifically requires that they be reflected in the Specific Plan prepared by the City.

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Resolution USOI-144 further requires adoption of policies that address the matters concerning lands subject to Williamson Act contracts. Such policies should address the City's intended approaches to any option the City may hold to terminate such contracts under Government Code section 51243.5, and the policy the City intends apply with respect to nonrenewal of such contracts under Government Code section 51246.

The Specific Plan, unfortunately, does not incorporate any such policies. In fact, it makes no reference to Williamson Act Contracts. The DEIR does make reference to Williamson Act contracts, but simply for the purpose of noting that the Specific Plan is not consistent with existing Williamson Act Contracts, and that it will result in significant impacts on those existing contracts. It further adopts no mitigation measures concerning this impact, and simply confirms this is a significant and unavoidable impact with no available mitigations. It therefore intends to adopt a statement of overriding considerations on such matters.

Regarding the requirements of Resolution USOI-144 that the SEDA Specific Plan incorporate a master service delivery plan, the proposed Plan simply asserts that a "pending SEDA Public Facilities Financing Plan", will address important elements of the Plan. It defers that financing plan, and thereby fails to satisfy the requirement of Resolution USOI-44 that these arrangements be incorporated into the Specific Plan. (See Specific Plan-Planning Context, Complete A Public Facilities Financing Plan, p.3; Policy RC-3.3, Water Recycling-Residential Landscaping and Small Farms and Community Farming, p.104; Policy RC-4.1, Minimizing Groundwater Extraction, p. 105; Policy RC-4.2, Replacement of Extracted Groundwater, p.105; Policy RC-4.3, Maximizing

Groundwater Recharge, p.105; Policy RC-6, Water Supply and Delivery, p. 107; Policy RC-6.1, Site Development-Level Water Supply and Delivery Systems, p. 107; Policy RC-6.3, Flood Control and Stormwater Management-Sub-Area or Development Proposal delivery, p. 108; Policy RC-6.4, Flood Control and Stormwater Management-Shared Resources and Infrastructure, p. 109). The plan to finance these public facilities, which are so important to addressing environmental impacts, were intended to be addressed in the Specific Plan. This has not been done. The DEIR simply notes that the Financing Plan will be a subsequent element of the Project, and assumes its components will adequately address the Specific Plan's requirements, including intended elements of intended environmental mitigations (See DEIR Policy RC-3.3, Small Farms and Community Farming, at p. 3.18-48).

Because the Specific Plan does not conform to the express requirements of Resolution USOI-144, which identified important environmental impacts of developing the SEDA lands, the DEIR violates the requirements of the California Environmental Quality Act ("CEQA") that the environmental consequences of a government decision on whether to approve a project will be considered before, not after, that decision is made. (*Stanislaus Natural Heritage Project v. County of Stanislaus* (1996) 48 Cal.App.4th 182, 190). It also violates the requirement that an EIR "should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences." (CEQA Guidelines section 15151)

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B. <u>The Project Lacks Sufficient Planning Details to Permit in an Adequate DEIR Analysis of Its Potential Environmental Impacts</u>.

A fundamental purpose of CEQA is to "inform the public and responsible officials of the environmental consequences of their decisions before they are made. (*Stanislaus Natural Heritage Project v. County of Stanislaus, supra*, 48 Cal.App.4th at 190). In addition, an EIR "should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences." (CEQA Guidelines section 15151). It is true that the degree of specificity required in an EIR will correspond to the degree of specificity involved in the underlying activity which is described in the EIR. (CEQA Guidelines section 15146). In this instance, the project is a specific plan, and the City's Specific Plan fails to provide the information generally required for specific plans under Government Code section 65451.2 The DEIR therefore fails to satisfy CEA's

[2] Because the City is a Charter City, the requirements of Government Code Section 65451 do not apply to it unless it has otherwise confirmed, by ordinance or resolution, an intention to comply with such provisions. (Government Code sections 65700 and 65803). However, in this instance the requirement of preparing the Specific Plan is an element of LAFCO Resolution USOI-144. By accepting the benefits of that Resolution, the City has committed to be bound by its requirements. Whether Resolution USOI-144 intended that the Specific Plan satisfy the minimum thresholds established in Government Code Section 65151 is a matter of interpretation for LAFCO to address. However, in addition to not satisfying the

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requirements because the Project which it evaluates is too vague to permit sufficient environmental impact evaluation. (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 192-193, *Save Our Capitol! v. Department of General Services* (2023) 87 Cal.App.5th 655, 674).

Standard provisions of a specific plan should include details for the proposed distribution, location, and extent and intensity of major components of public and private transportation, sewage, water, drainage, solid waste disposal, energy, and other essential facilities needed to support the land uses described in the plan. (Government Code section 65451(a)(2)). In addition, a specific plan generally includes a program of implementation measures including regulations, programs, public works projects, and financing measures necessary to carry out the development of the land uses intended by the plan. (Government Code section 65451(a)(4)). However, the Specific Plan lacks sufficient detail concerning such matters. As noted above and below, the Specific Plan defers preparation of both its intended infrastructure financing plan, and its zoning standards, which will subsequently establish the intended development densities and other regulations for its land use designations.

Where, as here, a specific plan does not incorporate the information, in sufficient detail, generally required for such a plan, and instead defers such matters to future preparation, the CEQA document cannot meaningfully evaluate the environmental impacts of the intended project. An insufficiently detailed project cannot be adequately subjected to appropriate environmental review (*Santiago County Water District v. County of Orange* (1981) 118 Cal.App.3d 818, 829). The DEIR thereby fails to satisfy its fundamental purpose of CEQA, to "inform the public and responsible officials of the environmental consequences of their decisions before they are made". (*Stanislaus Natural Heritage Project v. County of Stanislaus Court of Appeal, supra*, 48 Cal.App.4th at 190).

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For example, the Specific Plan attempts to address the qualities of the size, density, composition and building character of its extensive complement of new Mixed-Use Districts, by requiring that they be consistent with new zone district standards to be adopted in the future, as part of a SEDA Development Code update. (Specific Plan, at Policy UF-2.2 Development Code Update, p. 27). Some density standards are described for some of the new land use categories. However, the Plan confirms that those density standards, and other aspects of the development standards and regulations, are to be set forth in the presently undefined Development Code update. That updated code will replace all previous zoning designations and will supersede the General Plan and all applicable Specific Plans, including the SEDA Specific Plan. (Specific Plan, page 39). The failure to incorporate meaningful details of those standards in the Specific Plan fails

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minimum statutory requirements of a specific plan, as noted in Section A, the Specific Plan also does not satisfy the express requirements of Resolution USOI-144, resulting in its failure to address important environmental consequences of the Specific Plan.

to address these important aspects of the Specific Plan's intended scope of development, and results in an inadequate CEQA evaluation of its environmental impacts.

Public Resources Code section 21155.4 provides that any future project consistent with an adopted specific plan, and which implements certain transit oriented development projects, may obtain exemptions from compliances with CEQA. Here, the Specific Plan lacks appropriate details. As a result, the CEQA evaluations are incomplete. Nevertheless, further CEQA compliances for future projects might not later occur. This adds additional importance to the need to assure that the Specific Plan is sufficiently detailed so its CEQA evaluations are conducted appropriately as part of its adoption.

C. The Project Is Inconsistent With Relevant Provisions of the City's General Plan - The Impacts of This Inconsistency Was Not Analyzed in the DEIR.

Government Code section 65454 mandates that a specific plan must be consistent with the relevant general plan. This provision of the State Planning and Zoning Law is applicable to Charter cities. (Government Code section 65700). In addition, CEQA requires that any inconsistency of a Project with relevant land use policies should be evaluated as a potentially significant impact. (Guidelines, appen. G, section XI, subd. (b).

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The Specific Plan intends to assure its consistency with the General Plan by the City later adopting amendments to the General Plan to incorporate its new land use designations. While that is not unusual, what is unusual is that the zoning standards applicable to the implementation of the new land use designations are also being deferred until sometime into the future. As a result, the environmental impacts of the new Specific Plan's land use designations cannot be meaningfully evaluated unless and until those zoning standards are available for public review and comment.

In addition, the City of Fresno General Plan, at Section 1.3 (Development Under the Plan – Dwellings, Population, and Jobs) confirms that the Specific Plan for SEDA is required to include a "comprehensive provision of public infrastructure". However, the Specific Plan does not contain the required comprehensive policies, programs or plans necessary for any comprehensive provision.

Instead, the Specific Plan states that its goal is simply "to set a clear vision for how Southeast Development Area will develop over time". (Specific Plan, page 16, at "Next Steps: Setting the Stage for Implementation"). The Specific Plan's required program for comprehensive provision of public infrastructure is instead deferred by proposing that the City Council will, at some subsequent time, "direct which financing options to pursue", and will then complete a Public Facilities Financing Plan. (Specific Plan, page 17, at "Complete a Public Facilities Financing Plan").

The Specific Plan, while it intends to identify major infrastructure requirements, fails to include the comprehensive provision of public infrastructure required by the

terms of the General Plan. Because the Specific plan does not satisfy these requirements of the General Plan, it is inconsistent with the General Plan. The DEIR, at Table 3.11-1 lists what it perceives to be a Consistency Determination of the various policies of the Specific Plan with the General Plan. However, that listing fails to reference Section 1.3 of the General Plan. The DEIR therefore fails to identify the impacts of this inconsistency with the General Plan. As a result, it violates the requirements of CEQA that an EIR evaluate the impacts of any inconsistency in the Project and land use policies of the lead agency.

In addition, the General Plan, in its commentary under Implementing Policy UF-13.a, confirms that a Specific Plan is intended to further define the requirements and regulations of the General Plan "to coordinate more discreet land use and transportation design integration and intensity with necessary public facilities, maintenance, and services financing" for the relevant development area. Though the Specific Plan does identify some major infrastructure requirements, it does not indicate how such infrastructure is designed to integrate with the intensity of the intended development, because important facets of that density is deferred to a future SEDA Development Code update.

For example, table 2.1 of the Specific Plan identifies types of streets that will be included in various land use districts. However, there is no discussion about how the delineation of those transportation facilities is intended to accommodate the development and uses reflected in the Specific Plan.

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The DEIR takes the limited information included in the Specific Plan and makes the conclusion that the Project will be consistent with the General Plan policy that calls for planning and design of roadway systems to meet LOS D on major roadways. The sole assurance of this is the statement that "Roadway improvements to increase capacity and maintain LOS standards would be planned and programmed based on the total overall needs of the roadway system, recognizing the priority of maintenance, rehabilitation, and operation of the existing road system." (DEIR at p. 3.17-30). However, the actual impact on existing roadways is nowhere detailed in either the Specific Plan or its DEIR. This is presumably because, without any understanding of the density of developments in the land use designations, the projected traffic demands on specific roadways cannot be fairly estimated. As a result, the queuing analysis for impacts on the State High system interchanges, requested by Caltrans in its Comment Letter dated August 25, 2023, was not prepared.

The intended density of development that the public facilities will be required to support is not included in the Specific Plan. Those important elements of a legally compliant specific plan are simply deferred to a future adoption of a SEDA Development code update. As a result, the DEIR fails to evaluate the environmental impacts of the Project.

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D. The Specific Plan Intends for an Undefined SEDA Specific Plan Development Code to Supersede Its Development Standards (Including Relevant Density Standards) - the DEIR's Analysis of the Environmental Impacts of These Unknown Development Standards Is Therefore Inadequate.

The Specific Plan intends to defer the designation and adoption of density and land use standards until adoption of the SEDA Specific Plan Development Code. (Specific Plan, page 39). This is not simply the deferral of refinements to the Specific Plan's intended policies. These undefined Development Code updates are instead intended to have such importance to the intended development area that they will replace all previous zoning designations and will supersede the General Plan and all applicable Specific Plans, including the SEDA Specific Plan. (Specific Plan, page 39). Where, as here, the most consequential elements the Specific Plan's standards of development are not disclosed to the public or other agencies, no meaningful environmental evaluation of its environmental impacts can be sufficiently conducted.

These deferred Specific Plan elements are not simply limited to the intended density standards of the proposed land use designations. As an example, Section 2.3.2 of the DEIR discusses locations of open space and institutional features intended by the Specific Plan. However, it states that those locations, as well as roadway configurations and transit alignments, are more closely specified in an Infrastructure Plan. That Infrastructure Plan referenced in the DEIR is nowhere identified or disclosed in the Specific Plan (or otherwise in the DEIR). 43 CONT

Deferral of fully binding density standards for the Specific Plan's land uses, and intended location of key public facilities, significantly diminishes the ability of the DEIR to evaluate the project's environmental impacts. This causes the DEIR to fail its obligation to provide information to the public and the elected officials as to the Specific Plan's potential environmental impacts.

E. The Specific Plan Abolishes the "Permanent Buffer" Along Its Eastern Border Intended to Separate and Preserve Long-Term Agricultural Uses Outside Its Borders – the Consequences of Which Are Nowhere Disclosed in the DEIR.

An important public policy goal for the Specific Plan is to minimize its impacts on various classes of agricultural lands. (See LAFCO Resolution USOI-144, Section 8-3). In furtherance of this goal, the Specific Plan states that the Plan will create an agricultural buffer between developed areas of SEDA and the agricultural lands to its east. (Specific Plan, p. 60).

However, the existing land uses allocated to SEDA in the General Plan already establishes a buffer. The General Plan states that this is to be a permanent buffer area, designed to separate and preserve long-term agriculture outside of the eastern SOI boundary from urban uses inside the SOI Boundary. (General Plan, p.3-25). Table 15-802 of the City Development Code sets forth the limited uses that can be conducted

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within that Buffer zone, with manufactured housing, and secondary units, being the sole housing type permitted.

The Specific Plan proposes to abolish this existing adopted Buffer zone in the SEDA area. It instead intends to allow Rural Cluster Residential uses in the area of lands previously designated with the Buffer Zone. The DEIR states that this Rural Cluster Residential uses will serve as a transitional buffer, and states that this area will provide average gross density of 0.1 to 0.5 units per acre.[3] This change in the uses permitted in the Buffer can be seen by comparing Map 2.4, SEDA General Plan Land Use (Existing), with Map 2.5, SEDA Proposed Land Use Map, at pages 21 and 22 of the Specific Plan.

The Specific Plan therefore relaxes the existing restrictions that the General Plan established for development within the existing Buffer Zone, and diminishes from permanent to transitional status. The Specific Plan instead intends to allow a greater extent of housing, and potentially other uses. However, this change in the existing Buffer zone is nowhere discussed in the DEIR, and the impacts of allowing greater development within those areas is therefore nowhere analyzed in the DEIR. This is a significant change to an existing land use designation that was previously adopted to help diminish in conversion of farmland to nonagricultural uses.

The DEIR asserts that no feasible mitigation measures to address this impact are available. However, the proposed Specific Plan's change in the General Plan's Buffer zone exacerbates the impact. One feasible mitigation measure would therefore be the retention of the General Plan's established Buffer zone. Where, as here, the DEIR is intending to amend a prior mitigation measure of the existing General Plan, the DEIR must discuss the reasons that justify any change to the Buffer zone, and the potential consequences of allowing new Rural Cluster Residential uses within its environs. That discussion is particularly important where the DEIR otherwise determines this impact is significant, and unavoidable. The DEIR should be updated to include this discussion, and should then be recirculated.

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F. Rather Than Rely Upon the Undefined Standards of Mitigation Measure MM Ag-2, the City Should Defer Adoption of the Specific Plan Until It Adopts the Farmland Preservation Program Intended by General Plan Policy Rc-9-C.

The DEIR, at p. 3.2-17, details the intention of the General Plan Policy RC-9-b to implement a Farmland Preservation Program. It seeks to assure that such a program, when adopted, will ensure mitigation of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance. Until the program is adopted, the DEIR intends to implement, through MM AG-2, an ad hoc mitigation program whose standards are entirely undefined.

[3] As noted above, the Specific Plan provides that the densities stated in the Plan can be overridden by whatever standards are set forth in the yet to be developed SEDA Development Code.

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The City adopted General Plan Policy RC-9-b nearly a decade ago, on December 18, 2014. It has had much time to prepare an appropriate program that addresses the intentions of that mitigation standard. Continuing in place an arrangement for ad hoc mitigations, based upon undefined standards, is not an acceptable alternative to a defined and adopted uniform program and policy that General Plan Policy RC-9-b intended. (See *Center for Sierra Nevada Conservation v. County of El Dorada* (2012) 202 Cal.App.4th 1156). This is particularly true given the amount of time that has been available to adopt such a program.

Rather than adopting MM AG-2 as a new mitigation measure, the City should defer finalizing this Specific Plan until after the program intended by General Plan Policy RC-9-b is fully adopted. Only then can both the agricultural community and the development community understand the requirements for development within the Plan where relevant farmland is being impacted. MM AG-2, standing alone, has insufficient performance standards to satisfy appropriate standards for deferred mitigation. It includes no mitigation ratio, does not address potentially appropriate exemptions and exclusions, or the locations of lands covered by conservation easements. It thereby leaves too many aspects of the arrangement too ill defined to fully assess its efficacy.

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The fact that the impacts on relevant farmlands are identified as an unavoidable and mitigatable significant impact does not allow the DEIR to fail to adopt feasible mitigation measures. The adoption of General Plan Policy RC-9-b intended to allow appropriate deliberation of a comprehensive program to address such impacts. That program should be adopted before annexations within SEDA begin and before the Specific Plan is adopted.

G. <u>The Specific Plan and Its DEIR Should Address Phasing Policies and Assure That Lands in the City's Sphere Adjacent to, but Outside SEDA, Are Prioritized For Development Before SEDA Lands</u>.

The Specific Plan's implementation objectives provides that development of SEDA is to occur in an organized and phased manner. (Specific Plan, p.12, DEIR p. 2-12). The DEIR also states that annexations will be "strategic and proactive to facilitate infrastructure development by the City." (DEIR at p. 2-3). An important value of a phasing plan is that it can help diminish the pressure on early conversion of farmlands and impacts on existing rural residential uses within the Specific Plan boundaries. It may also help extend the period before the development within the Specific Plan pressures conversion of farmlands outside the Specific Plan, or rural residential uses in proximity to the Specific Plan boundaries.

A phasing program is therefore a tool that can help achieve many of the objectives of the Specific Plan's requirements set forth in LAFCO Resolution USOI-144, Section 8-3, regarding the Project's impacts on existing rural residential neighborhoods. It is also an important tool to mitigate the impact on farmland conversions, which is

particularly important where, as here, the DEIR finds that such impacts cannot be mitigated and are otherwise a significant an unavoidable circumstance. Even where that circumstance exists, CEQA nevertheless requires that all feasible mitigation measures are adopted. Yet, in this instance the Phase plan, while promised, is not adopted and is therefore not available as a mitigation tool.

One easy phasing strategy we recommended is a policy of the City to help insure that the unincorporated lands west of Temperance Avenue within the City Sphere of Influence are timely annexed before annexation begins with SEDA. However, an even broader phasing strategy would provide a greater extent of mitigation on the premature conversion of farmlands and impacts of development on existing rural residential uses.

Unfortunately, the Specific Plan does not include any phasing strategies. The accompanying DEIR therefore does not assess all potential mitigations that can be provided by a thoughtful phasing program. Such a program might include advancing construction of relevant public facilities necessary to support development. It might also include milestones before lands in various phases can have development commence.

The Specific Plan should be updated to incorporate the phasing plan that would allow the DEIR to assess the extent to which a proposed phasing will help mitigate the impacts of the project on rural residential neighborhoods and the conversion of farmlands. Such an assessment should be included in a recirculated DEIR. 43 CONT

H. <u>The DEIR Does Not Assess the Adequacy of Existing City Ordinances to Support the Existing Rural Residential Neighborhoods Within the Plan</u>.

LAFCO Resolution USOI-144, Section 8-3, confirms that the Specific Plan is to, among other aspects, emphasize the retention of characteristics in rural residential neighborhoods within the Plan's environs after their annexation into the City. This policy concerns an important environmental impact of the Specific Plan.

The Plan and the DEIR simply state that the existing uses on those parcels will remain protected under the Annexation Overlay Ordinance approved in City of Fresno Bill 2008-10. (Specific Plan, p. 29, DEIR, p. 2-8). Unfortunately, the text of bill 2008-10 is not set forth in the Specific Plan or the DEIR, and it is not a document that is readily available for public review. However, the City's Development Code includes Section 15-1606, that establishes an Annexed Rural Residential Transitional (ANX) Overlay District, which was codified as part of the adoption of the City's most recent comprehensive update to its Development Code in Ordinance 2015-39, effective January 9, 2016. It is unclear whether the provisions in Municipal Code Section 15-1606 is what was intended to be referenced in the DEIR and Specific Plan, or whether other provisions were intended.

The Annexation Overlay Zone in Municipal Code Section 15-1606 does protect a range of existing uses. However, it allocates such uses and their structures to legal

nonconforming status. That status may create difficulties with lenders and buyers of property, and the imposition of those constraints are not consistent with protecting the maintenance of such rural residential uses. That legal nonconforming status will also hinder appropriate expansion of existing legal nonconforming structures that may be reasonable and desirable to maintain thriving rural residential neighborhoods.

In fact, LAFCO Resolution USOI-144, Section 8-3, intends that the Specific Plan's program for retention of rural residential neighborhoods in annexed lands would allow for appropriate improvements needed to incorporate their characteristics into the urban landscape. While the City's legal nonconforming regulations at Municipal Code sections 15-404 and 15-405 allow some expansion in single family residential structures, similar expansion of other ancillary structures is not permitted except with the attainment of subsequent entitlements. In addition, expansions of single-family residential structures requires that the improvements conform to the standards of the newly allocated Base District. (Municipal Code Section 15-405-E-1).

LAFCO Resolution USOI-144, Section 8-3 has emphasized the importance of a program for annexation that is intended to emphasize the retention of characteristics of rural residential neighborhoods that make them desirable places to live. The Specific Plan does not include such a program. Further, the DEIR does not evaluate the characteristics of the existing rural residential neighborhoods. Nor does it evaluate the adequacy of the provisions of Municipal Code Section 15-1606, and the associated noncomforming legal use standards of the City, to assess whether those annexed rural neighborhoods will be able to effectively maintain their qualities intended by LAFCO Resolution USOI-144. 43 CONT

The DEIR should be updated to include an assessment of the existing City ordinances that will govern existing residential neighborhoods within the Plan after annexation, and whether those standards adequately protect their retention. It should also recommend any refinements to the existing City Ordinances where necessary. That information should be included in an updated and recirculated DEIR.

I. Elements of the DEIR's Mitigations of Water Supply Impacts Need Clarification.

The Specific Plan, at p. 105, under Policy RC-4.2, states that the North Kings Groundwater Sustainability Plan was approved in 2019. The Plan approval was subject to subsequent review and approval by the Department of Water Resources, and that plan was conditionally approved by the Department of Water Resources in 2023.

More importantly, Policy RC-4.2 states that all groundwater drawn to serve development in the SEDA will be replaced "with at least an equal volume via infiltration, pumping or other means". However, both the Specific Plan and the DEIR fail to explain how groundwater is to be replaced by pumping, or what the other means are that it intends to reference.

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Policy RC-4.2 also states that the necessary recharge may not necessarily occur the same year as withdrawals, but asserts that over time total recharge will match total withdrawals. While all of those goals and intentions are desirable, some maximum period of mismatch between withdrawal and recharge should be identified. Consideration of impacts to sustainable management criteria should also be considered.

The City is situated on top of a single unconfined aquifer. To offset groundwater pumping, recharge must occur within a reasonable distance that demonstrates effectiveness. We are not opposed to regional recharge provided the groundwater pumping does not cause widespread regional impacts. Recharge outside of the North Kings Groundwater Sustainability Agency would not be considered reasonable.

The DEIR includes, as an appendix, a Water Technical Study prepared by Blair, Church, and Flynn Consulting Engineers (the "Water Study"). The Water Study identifies surface water supplied from both the United States Bureau of Reclamation (USBR) and the Fresno Irrigation District (FID) through existing agreements for groundwater recharge and potable use after treatment. According to the Water Study, the most recent FID agreement signed in 2016 provided for a maximum of 29% of FID's Kings River water supply to be available to the City. It is unclear per the FID agreement whether the water supply was intended for use within the Specific Plan boundary. The FID agreement, specifically Section 13.(c), states that "City and District mutually agree that the increase in percentages reflected in this Section 13 include allowances for moderate growth in Growth Area 1 of City's Sphere of Influence as shown in Exhibit C (as depicted as Figure IM-2 of the Fresno General Plan)." The DEIR should be revised to clarify this issue.

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Mitigation Measure HYD-2b requires that the City must, prior to exceeding existing water supply capacities, evaluate the water supply system and not approve development in the Specific Plan until additional capacity is provided through water system improvements in accordance with the City Metropolitan Water Resources Management Plan. We recommend that some threshold be adopted to confirm that there is a trigger, prior to the actual point of exceeding existing water supply capacity, when the evaluations will be performed, and when the improvements will be required.

The DEIR, at page 3.10-9, advises that the City is in the process of updating its Metropolitan Water Resources Management Plan (the "Metro Plan"). Mitigation Measure HYD-2d provides that new and expanded groundwater recharge facilities will be in accordance with that plan, and that those measures will be completed prior to new applications for future development in the Specific Plan. However, because the Metro Plan has not yet been updated, it is unclear how HYD-2d can be an effective mitigation measure when the standards that may be included in that Metro Plan update have not yet been determined. It is also unclear whether full construction of all intended recharge facilities within the Specific Plan, as identified by the Metro Plan, will be completed as part of the requirement that new and expanded recharge facilities will be completed prior to new applications for future development. This element of the Mitigation Measure

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should be clarified. These requirements could also be better assured if the Specific Plan incorporated a phasing program that focused development of necessary public facilities on the areas intended for priority development.

J. County as a Responsible Agency.

Section 2.5.2 of the DEIR should be updated to identify Fresno County as a Responsible Agency. That is because the County will be required to issue encroachment permits for construction within the County's road right-of-way, coordinate Williamson Act Contract cancellations, and approve required property exchange agreement(s) associated with future annexations in SEDA.

K. Conclusion.

Based on the foregoing, we respectfully request that the City not consider the Project DEIR until after there have been appropriate updates to the Specific Plan and the DEIR, to address the matters detailed above.

Sincerely,
McCORMICK, BARSTOW, SHEPPARD,
WAYTE & CARRUTH LLP

Jeffrey M. Reid

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cc: Bernard Jimenez, Planning & Resource Management Officer
Fresno County Department of Public Works and Planning

Enc. LAFCO Resolution USOI-144

RESOLUTION NO. USOI-144

FRESNO LOCAL AGENCY FORMATION COMMISSION
FRESNO COUNTY, CALIFORNIA

REQUEST FOR REVISION TO THE CITY OF FRESNO SPHERE OF INFLUENCE	)))	ADOPTED FINDINGS AND APPROVED WITH CONDITIONS

WHEREAS, in order to carry out its purposes and responsibilities for planning and shaping the logical and orderly development and coordination of local governmental agencies so as to advantageously provide for the present and future needs of the County and its communities, this Commission has the authority under the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000 (the "Act") to develop and determine the sphere of influence of each local governmental agency within the County and enact policies designed to promote the logical and orderly development of areas within the sphere (California Government Code Section 56425(a); and

WHEREAS, this Commission has the authority to establish spheres of influence, or to revise or amend adopted spheres of influence of local governmental agencies after a noticed public hearing called and held for that purpose (California Government Code Section 56427); and

WHEREAS, a proposal for a revision to a local government's adopted sphere of influence may be made by the adoption of a resolution of application by the legislative body of an affected local agency (California Government Code Section 56654(a); and

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WHEREAS, the City Council of the City of Fresno, California, adopted a resolution of application (Resolution No. 2005-507) on the 6th day of December 2005, applying to the Fresno Local Agency Formation Commission (LAFCo) for consideration of an amendment (hereafter referred to as the "Proposal" or "proposed SOI revision") to the City's Sphere of Influence to include the "Southeast Growth Area", consisting of approximately 8,863 acres, as identified in the Fresno 2025 General Plan; and

WHEREAS, the City of Fresno filed a certified copy of said resolution of application with the Executive Officer pursuant to California Government Code Section 56756; and

WHEREAS, the affected territory is generally described as an area bounded on the north by the Gould Canal, to the east by McCall, Highland and Temperance Avenues, on the south by Jensen, and North Avenues, and on the west by the existing Fresno Sphere of Influence boundary along Minnewawa, Temperance, and Locan Avenues, as depicted in "Exhibit A" attached to this resolution and made a part hereof; and

WHEREAS, said resolution of application (Resolution No. 2005-507) stated that Article VI of the City / County Amended and Restated Memorandum of Understanding (hereafter referred to as the "MOU" or "tax sharing agreement") requires the City to meet various conditions before proceeding with development within the Southeast Growth Area; and

WHEREAS, said resolution of application states that the City has met all the conditions identified in Article VI of the MOU with the exception of the preparation and approval of the Southeast Industrial Growth Area Business Park Specific Plan and attainment of the 60% residential development build-out in selected Community Plan Areas, and that provided the SOI amendment is approved, the City will move forward with the preparation and adoption of various Community and Specific Plans; and

WHEREAS, at its March 16, 2005 hearing the Local Agency Formation Commission requested more detailed environmental analysis, especially with respect to issues related to the preservation of agricultural lands; and

WHEREAS, in response to the request for more detailed environmental information, the City caused to be prepared a more detailed initial study to support a new Environmental Assessment (No. SOI-05-01, Finding of Conformity to the 2025 Fresno General Plan Master Environmental Impact Report (MEIR 10130) dated September 29, 2005); and

WHEREAS, the City Council reviewed the more detailed environmental information and found that the information supports and reaffirms the original finding and made a new finding based on the new information that there is no substantial evidence in the record that the "Southeast Growth Area SOI Amendment" may have an adverse impact on the environment; and

WHEREAS, as commended by Section 56425 (b) of the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000, the City of Fresno presented the proposal to the Fresno County Board of Supervisors and requested them to support and concur with the City's request; and

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WHEREAS, at its January 31, 2006 hearing, by a vote of three to two, the Board of Supervisors approved its support of a resolution of reapplication to LAFCo for an amendment to the City's SOI to include the Southeast Growth Area; and

WHEREAS, pursuant to Section 56425 (b), when there is an agreement between the County and a city seeking an SOI amendment the Commission shall give great weight to the agreement in its final determination of the city's SOI; and

WHEREAS, said application for an SOI revision was deemed complete and accepted for filing by the Interim Executive Officer and a Certificate of Filing was issued pursuant to California Government Code Sections 56651 and 56658(g), and accordingly Commission proceedings were deemed initiated; and

WHEREAS, the Executive Officer set this matter for hearing on April, 12, 2006, at the hour of 1:30 p.m., and caused notice of said hearing to be published in accordance with California Government Code Section 56153 in a newspaper of general circulation which is circulated within the territory affected by the sphere of influence proposed to be amended; and

WHEREAS, pursuant to Government Code Section 56665 the Executive Officer reviewed said application and all supporting materials and prepared a report to this Commission, including a recommendation for approval with specified conditions, said report having been mailed to the Commission, the officers or persons designated in the application, each local agency whose boundaries or sphere of influence would be changed by the Proposal, and each affected local

agency that has filed a request for a report with the executive officer, at least five days before said hearing; and

WHEREAS, this Commission reviewed the Executive Officer's report and recommendation and all supporting materials, including Initial Study No. SOI-05-01, Finding of Conformity to the 2025 Fresno General Plan Master Environmental Impact Report (MEIR 10130) dated September 29, 2005, the Master Environmental Impact Report, and all other documents that were incorporated by reference into said report, pursuant to Government Code Section 56665(d), which report was duly considered by this Commission pursuant to State law; and

WHEREAS, said Proposal was considered by this Commission at said hearing on the 12th day of April, 2006, at which the Executive Officer presented staff's report and recommended approval of the Proposal with specified conditions, and testimony was presented in favor and against the Proposal; and

WHEREAS, this Commission considered all relevant factors and evidence and heard all affected agencies and interested parties wishing to speak on said application; and

WHEREAS, as Responsible Agency, this Commission independently reviewed and considered the information in the Draft and Final MEIR for the Fresno 2025 General Plan and the City's subsequent "Environmental Assessment / Initial Study" and the City's "Finding of Conformity" issued pursuant to Section 21157.1 of the California Public Resources Code (California Environmental Quality Act "CEQA") prior to taking its action, and determined that the City's finding is appropriate, pursuant to State law, and that the Proposal is consistent with these documents and that these documents are sufficient on which to make a determination on the proposed sphere of influence revision.

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NOW, THEREFORE, BE IT RESOLVED that the Fresno Local Agency Formation Commission does HEREBY STATE, FIND, RESOLVE, DETERMINE, AND ORDER as follows:

SECTION #1 – This Commission hereby adopts the findings required by the California Environmental Quality Act (CEQA) listed below:

1. Acting as a Responsible Agency under CEQA Guidelines, the Final Master Environmental Impact Report prepared for the 2025 Fresno General Plan by the Lead Agency, the City of Fresno, has been prepared in accordance with the requirements of CEQA Guidelines (Public Resources Code, Section 21000 *et seq.*) and the Guidelines for Implementation of the California Environmental Quality Act (CEQA Guidelines – California Code of Regulations, Title 14, Section 15000 *et seq.*).

2. This Commission considered the information in the Final Master Environmental Impact Report and the Initial Study upon which the Lead Agency determined said project to be within the scope of the "Master Environmental Impact Report (MEIR) No. 10130" prepared and certified for the 2025 Fresno General Plan, prior to making a determination about the Proposal, together with any and all comments received during the public review process pursuant to the California Environmental Quality Act (CEQA), and finds on the basis of the whole public record before the Commission, including the Final Master Environmental Impact Report and the Initial Study and any comments received, that there is no substantial evidence that the project will have a significant effect on the environment, and that the Lead Agency's determination pursuant to Section 21151.1 of the California Public Resources

Code (California Environmental Quality Act "CEQA") reflects the Lead Agency's independent judgment and analysis pursuant to CEQA Section 15074, *et seq.* (Public Resources Code Sections 21083 and 21087).

3. Acting as Responsible Agency pursuant to California Environmental Quality Act (CEQA) Guidelines, the Commission hereby finds that the Lead Agency's determination is appropriate, pursuant to Section 21151.1 of the California Public Resources Code (California Environmental Quality Act "CEQA"), and finds that that Final Master Environmental Impact Report and the subsequent Initial Study are sufficient on which to make a determination on the proposed change of organization.

SECTION #2 – This Commission hereby finds that the proposed change of organization is consistent with LAFCo Policies, Standards and Procedures Section 330, "Sphere of Influence Updates and Revisions," and the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000.

SECTION #3 – This Commission hereby finds that the April 12, 2006 public hearing and consideration of the proposed SOI revision were legally noticed pursuant to California Government Code sections 56427 and 56153, and that all notices related to this matter were duly given in accordance with State law, including, but not limited to, the Act and CEQA Guidelines and governing laws.

SECTION #4 – This Commission finds that, pursuant to California Government Code section 56426.5(b)(1)(2) the proposed SOI revision will facilitate planned, orderly, and efficient patterns of land use and provision of services. The public interest in the change of organization substantially outweighs the public interest in the continuation of existing Williamson Act Contracts in the affected territory beyond the current expiration date of said Contracts. Additionally, the change of organization is not likely to adversely affect the continuation of said Contracts beyond their current expiration date. In making this determination, the Commission considered all relevant factors pursuant to California Government Code section 56426.5(b)(2)(A-C). 43 CONT

SECTION #5 - This Commission Determines that the MUNICIPAL SERVICE REVIEW AND SERVICES PLAN dated December 2005 prepared by the City of Fresno conforms to the requirements of Section 56430 of the California Government Code, and hereby adopts the proposed Written Determinations contained therein with the following addition:

Government Structure Options (Page 61) – Add: *4. As the provider of a full range of urban services the City is the logical agency to provide these services in the subject area.*

SECTION #6 – This Commission hereby makes the following determinations pursuant to Government Code Section 56425(e):

1. The proposed Sphere of Influence expansion will accommodate anticipated growth needs of the City of Fresno in the affected area, and, with certain recommended conditions for future annexations therein, will provide for all existing and planned uses.

2. The present and probable needs for public facilities and services in the area will be provided for as identified in the MUNICIPAL SERVICE REVIEW AND SERVICES PLAN

prepared by the City of Fresno. The need for additional facilities will be identified and addressed during the preparation and adoption of the Community or Specific plan for the Southeast Growth Area as required in conditions 1 and 2 of Section 8, below.

3. The present capacity of public facilities and adequacy of public services that the City provides or is authorized to provide have been adequately identified in the MUNICIPAL SERVICE REVIEW AND SERVICES PLAN prepared by the City of Fresno, and additional facilities needs will be identified and addressed during the preparation and adoption of the Community or Specific Plan for the Southeast Growth Area as required in conditions 1 and 2 of Section 8, below.

4. No social or economic communities of interest have been identified in the subject area that are deemed relevant to the Commission.

SECTION #7 – This Commission hereby approves the proposed revision to the City of Fresno Sphere of Influence to include the "Southeast Growth Area" (approximately 8,863 acres) within the City's adopted sphere of influence (LAFCo File No. USOI -144), as depicted in Exhibit "A".

SECTION #8 – If and when the City submits an application for annexation for any affected parcels within the amended SOI, the City shall complete the following plans and programs prior to the Commission's approval of such an application:

1. Prepare and adopt a Community or Specific Plan for the Southeast Growth Area, including the preparation, public review, and certification of environmental documents and findings pursuant to CEQA. This plan shall include, but not be limited to, policies to address the requirements of Section 56426.5 of the California Government Code for lands subject to Williamson Act contracts.

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2. Prepare and adopt a Master Service Delivery Plan for the Southeast Growth Area.

3. Prepare, adopt and begin to implement a program for annexing the designated open space areas in the approach corridor of the Fresno Air Terminal (areas designated with an "R" on the 2025 General Plan map), and for rural residential neighborhoods within the City's existing Sphere of Influence in the vicinity of the Southeast Growth Area. This program shall provide for logical and reasonable development, discourage urban sprawl, preserve open-space and prime agricultural lands, efficiently provide for government services, and encourage orderly development.

   The rural residential neighborhood annexation program should emphasize the retention of characteristics that make the neighborhoods desirable places to live, while making provisions for appropriate improvements needed to incorporate such characteristics into the urban landscape. The program should include an outreach effort demonstrating to residents that annexation into the City would provide for an enhanced living environment preferable to staying in an unincorporated enclave, surrounded or substantially surrounded by the City. This program shall also be applicable within the Southeast Growth Area, and shall be reflected in the Specific Plan prepared by the City as required by condition 1, above.

The annexation program for the designated Open Space areas in the Fresno Air Terminal approach corridor should be undertaken as a means to preserving open space lands that would otherwise not be proposed for annexation; thereby providing for the efficient extension of government services to areas beyond the approach corridor, and providing for orderly boundaries that will facilitate annexation of other properties proposed for urban development.

SECTION #9 - The Executive Officer is hereby authorized and directed to mail certified copies of this resolution as provided in Government Code Section 56882 and to file, as appropriate, in the office of the Fresno County Clerk all environmental documents, if any, pertaining to the approval of this Proposal, as required by state law.

* *

ADOPTED THIS 12th DAY OF APRIL, 2006, BY THE FOLLOWING VOTE:

AYES: Commissioners Lopez, Rodriguez, Fortune, Alternate County Commissioner Larson, and Waterston.

NOES: None

ABSENT: Anderson

STATE OF CALIFORNIA)
COUNTY OF FRESNO)

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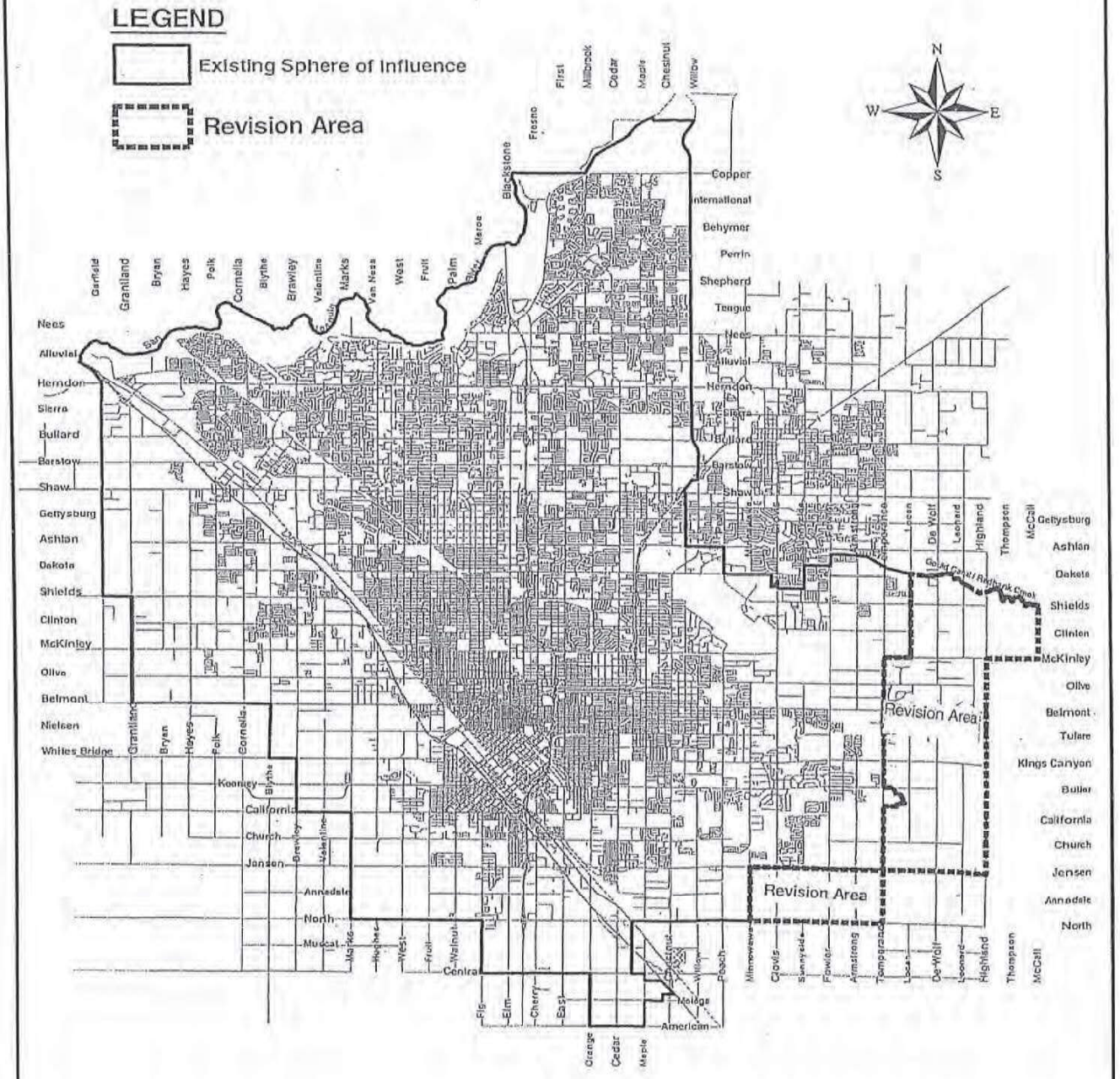
CERTIFICATION OF CHAIRMAN

I, Bob Waterston, Chairman of the Fresno Local Agency Formation Commission, Fresno County, State of California, certify that the foregoing resolution was adopted by the Commission at a regular meeting held on the 12th day of April, 2006.

Bob Waterston, Chairman
Fresno Local Agency Formation Commission

EXHIBIT "A"
RESOLUTION NO. USOI-144



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RESEARCH TO ACTION LAB

RESEARCH REPORT

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Patterns of Sprawl in Fresno and the Central San Joaquin Valley

Confronting Past, Present, and Future Housing Development Trends

Yonah Freemark *Samantha Fu* *Annie Rosenow* *Yipeng Su*

May 2024

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Acknowledgments

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We are grateful to our colleagues Joseph Schilling, Anna Shipp, Christina Stacy, and Daniel Teles for their thoughtful feedback; to Sam Lieberman for his research assistance; and to Lauren Lastowka for her editorial assistance. We also thank partners and stakeholders in Fresno and the Central San Joaquin Valley for their comments and suggestions.

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Executive Summary

Urban areas in the United States have been developing outwardly for more than a century. The availability of relatively cheap automobile transportation, massive investments in highways, construction of single-family homes, and a growing population have contributed to the systematic urban sprawl of metropolitan regions from their historic centers into what once was agricultural or natural land. This sprawl has been accompanied by disinvestment in city cores, increasing social and racial segregation, degradation of ecosystems, and pollution and other environmental harms. Though sprawl is a fact of life for many Americans, some urban planners and policymakers have promoted policy alternatives for decades that support denser development in urbanized areas.

To understand these opposing forces and study how living patterns have changed in one US metropolitan area, we explore patterns of development over time in Fresno and the broader Central San Joaquin Valley of California (comprising Fresno, Madera, Kings, and Tulare Counties). We evaluate the location of new housing development, its relationship to local demographic indicators, and the change in share of land devoted to agricultural and natural uses.

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Fresno's downtown has faced decades of disinvestment and underprovision of important local resources, like well-funded public services and retail options (Yung et al. 2022).[1] But, thanks to the forthcoming arrival of the state's new high-speed rail system along with a preliminary infrastructure investment in downtown from the state government, the region has a new opportunity to revitalize its historic city center and adjacent neighborhoods. Understanding past trends is critical for local and regional stakeholders to effectively leverage this opportunity to move the region toward an equitable and sustainable future.

This report paints a portrait of how patterns of sprawl in the region have changed over time. We find the following:

- Urban sprawl has continued unabated for decades in the Central San Joaquin Valley, consuming land at a greater rate than population growth. Overall, the region's urbanized land area has grown by 226 percent since 1970, while its population has grown by 153 percent over the same period. Similarly, developed land in Fresno County has grown by 175 percent—while

the county's population has only grown by 144 percent. This has led to an overall reduction in the average neighborhood density.

- Once they are developed into subdivisions of single-family homes, neighborhoods in the region rarely change their built form. After communities reach between 1,800 and 2,500 housing units per square mile—the density of many such subdivisions—they generally fail to add additional units. This is likely a consequence of restrictive zoning, homeowners' associations' policies, and limited demand for—or willingness to build—multifamily units. As a result, less than 30 percent of additional housing each decade has been added in infill locations, meaning neighborhoods that are already developed. The region has primarily accommodated growth through greenfield construction, meaning housing built on land that was previously used for natural or agricultural purposes, which tends to be on the periphery of urban areas. Meanwhile, communities near the region's center in downtown Fresno—whose inhabitants are predominantly people of color—have experienced limited investment over time.
- The sprawling growth of the region's urban areas has been associated with the loss of agricultural land on the edges of developed areas. In part because of a lack of adequate protections, new agricultural land has been added elsewhere in the region, displacing natural grasslands, forests, and other sensitive ecologies.

Our analysis also shows, however, that Fresno's sprawling development patterns were not inevitable. We compare the region with other parts of the US, showing that Fresno County could have accommodated its entire housing growth from 1990 to 2019 in central, already developed neighborhoods if it had adopted the patterns of infill construction that some other West Coast counties have pursued. If Fresno's residents and real-estate investors had chosen to invest in existing neighborhoods instead of creating new, sprawling subdivisions—and local and state officials had encouraged that approach—the region may have been able to avoid the racialized patterns of disinvestment and decay that we observe today. We estimate that such concentration of growth in infill areas would have not only substantially reduced the need to dislocate agricultural and natural land, but also likely reduced vehicle miles driven, carbon emissions, and public expenditures on infrastructure and services.

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State investments in new infrastructure offer Fresno—and the broader Central San Joaquin Valley region—a key opportunity to change these harmful development patterns and support denser and more equitable growth. Developers and even some policymakers, however, continue to promote sprawling development as the path forward, even though the results are higher greenhouse gas emissions, reduced access, and the neglect of central neighborhoods. To support more equitable and sustainable outcomes, stakeholders throughout the region must learn from past failures to constrain sprawl and build consensus on how to establish new patterns of development.

Patterns of Sprawl in Fresno and the Central San Joaquin Valley

Over the course of the twentieth century, the primary growth pathway for metropolitan areas throughout the United States has been building housing and other infrastructure in previously undeveloped areas, often described as greenfields (Barrington-Leigh and Millard-Ball 2015). This process required the massive conversion of natural and agricultural land into space used for urban development (Arellano, Roca, and Ros 2011). Though this outward expansion has slowed over the past several decades (Richter 2020; Sarzynski, Galster, and Stack 2014), most regions continue to accommodate a majority of their population growth not in already developed neighborhoods, but rather in newly built subdivisions and other neighborhood types at the metropolitan edge (Landis 2017). This pattern of development is known as urban sprawl, and is widely recognized as the de-facto pattern of development in the United States (Hamidi and Ewing 2014).

Urban sprawl is characterized by low-density, noncontiguous development spiraling outward from urban centers (see, for example, Burchell and Shad 1999). Brody (2013) describes six key characteristics of the phenomenon: low-density, single-family dwellings in monofunctional neighborhoods; automobile dependency in fulfilling daily activities; spiraling outward growth, rather than intensification of building in already-developed neighborhoods (infill growth); leapfrogging development patterns with growth in rural areas; commercial development in the form of strip malls and office parks along arterial highways; and undefined edges between urban and rural areas.

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Sprawl is the result of a complex set of interconnected factors, but land value is often considered to be a primary driver; sprawl tends to occur at the fastest rate in regions where growth is occurring (e.g., because of new jobs) and where property values are substantially lower on the periphery than in the center (Brody 2013). The growing demand for housing combined with the relative affordability of land on the periphery results in new building on the edges of cities and towns rather than in the center (Baum-Snow 2023). Other sprawl-inducing factors include rising incomes, which allow more households to purchase and use cars; reductions in the costs of using cars (e.g., because of lower gas prices); physical constraints on adding density (e.g., steep terrain or areas prone to flooding); incentivizing land-use policies (e.g., zoning that places limits on adding density in existing areas while enforcing freedom of development elsewhere); investments in new highway infrastructure and lack of support for alternative investments, such as public transportation; and racial strife and "white flight" (non-Hispanic white residents moving out of previously developed neighborhoods) that are produced by cultural and

societal trends (OECD 2018). Overall, sprawl increases as people and society at large become increasingly dependent on automobiles to travel between their homes and other destinations (Glaeser and Kahn 2004).

Researchers catalogue numerous negative consequences that result from urban sprawl. Environmentally, sprawling housing development infringes on open spaces, including sensitive areas like wetlands, wildlife corridors, and other natural habitats, as well as agricultural land, threatening a region's ecological sustainability and often resulting in a loss of biodiversity (Syphard, Brennan, and Keeley 2018). Sprawl can lead to increased air and noise pollution (as a result of automobile and truck use), water pollution, and increased flooding risks (Nechyba and Walsh 2004). The social and economic impacts of sprawl include increased racial and income segregation, expanded urban blight, social isolation, health conditions such as obesity, traffic congestion, and higher costs of providing infrastructure and public services (Bray, Vakil, and Elliott 2005; Brueckner and Helsley 2011; Carruthers and Ulfarsson 2008; Frumkin, Frank, and Jackson 2004). As sprawl redirects growth from one part of a metropolitan area to another, one additional consequence is that housing development becomes rare in jurisdictions and neighborhoods with low incomes and low demand, since developers can respond to demand for homes by building at the far edge of regions, where there are low land costs and high demand (Freemark 2022). This may lead to low-income neighborhoods experiencing disinvestment and decay, while high-income, suburban neighborhoods benefit from the majority of private and public investment.

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For these and other reasons, some city planners have for decades promoted alternatives to sprawl, often described as "smart growth" policies, through infill development, meaning development in areas that already have buildings and that are relatively more densely populated (Knaap et al. 2022; US Environmental Protection Agency 2014). The New Urbanist movement, for example, has since the 1980s promoted the construction of mixed-use, higher-density neighborhoods.[2] The related concept of transit-oriented development is premised on the idea that in areas with access to public transportation options, higher densities can provide people the opportunity to reduce automobile dependence.[3] In the last decade, the Yes in My Backyard, or YIMBY, movement has explicitly encouraged changes to local land-use policies to encourage these types of developments.[4] Metropolitan areas thus experience contradictory forces: On the one hand, decades of outward sprawl due to a combination of political, economic, and social factors, and on the other, efforts to encourage dense infill construction.

To understand these opposing forces and study how living patterns have changed in one US metropolitan area, we examined development over time in Fresno and the broader Central San Joaquin Valley, California. Urban Institute researchers have partnered closely with stakeholders in the area

since 2018 on a broad range of topics including upward mobility, equitable development, and climate action. This report was inspired by conversations with regional partners, particularly leaders at the Central Valley Community Foundation, who lead several initiatives in the area.

With about 550,000 residents as of 2022, the city of Fresno is the largest in California's Central Valley; the city is also at the core of Fresno County, which is coterminus with the census-designated metropolitan area and has a population of about 1 million. Despite its position as the heart of one of the nation's most important agricultural zones, Fresno suffers from some major economic challenges. In 2016, it ranked 253 of 274 among cities nationwide in terms of economic and racial inclusion (Poethig et al. 2018).[5] Like many Rust Belt cities, it has a large amount of vacant land, particularly near the historic city core. Its per capita incomes are only two-thirds of those across the state of California, and its poverty rate is more than 50 percent higher.[6] Its unemployment rate is consistently about two times as high as that in the San Francisco metropolitan area,[7] in part because, unlike many of California's coastal regions—where booming service industries, such as technology, predominate—Fresno's economy is more focused on agricultural and industrial pursuits.

Disinvestment in Fresno's core neighborhoods has also resulted in health and environmental disparities. A recent analysis by ECONorthwest for the Greenfield Coalition, for instance, demonstrates clear disparities in environmental, health, and socioeconomic indicators between neighborhoods in the city's south and southwest (which encompass the downtown area and adjacent neighborhoods) and wealthier neighborhoods to the north.[8] These disparities are often discussed in the region and across the state—advocates often cite the 20-year difference in life expectancy between wealthy zip codes in the northern part of the city and poorer zip codes in the south.[9]

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As with many other cities in the US, the disparities in Fresno are extremely racialized. The majority of both the city and county's residents are Hispanic or Latino (53 percent of the city's residents and 55 percent of the county's residents in 2022). Non-Hispanic white people account for 26 percent of the populations of both Fresno County and the four-county Central San Joaquin Valley region. Fresno County is home to a slightly larger Asian and Black population (11 and 4 percent, respectively), compared to the four-county region.[10]

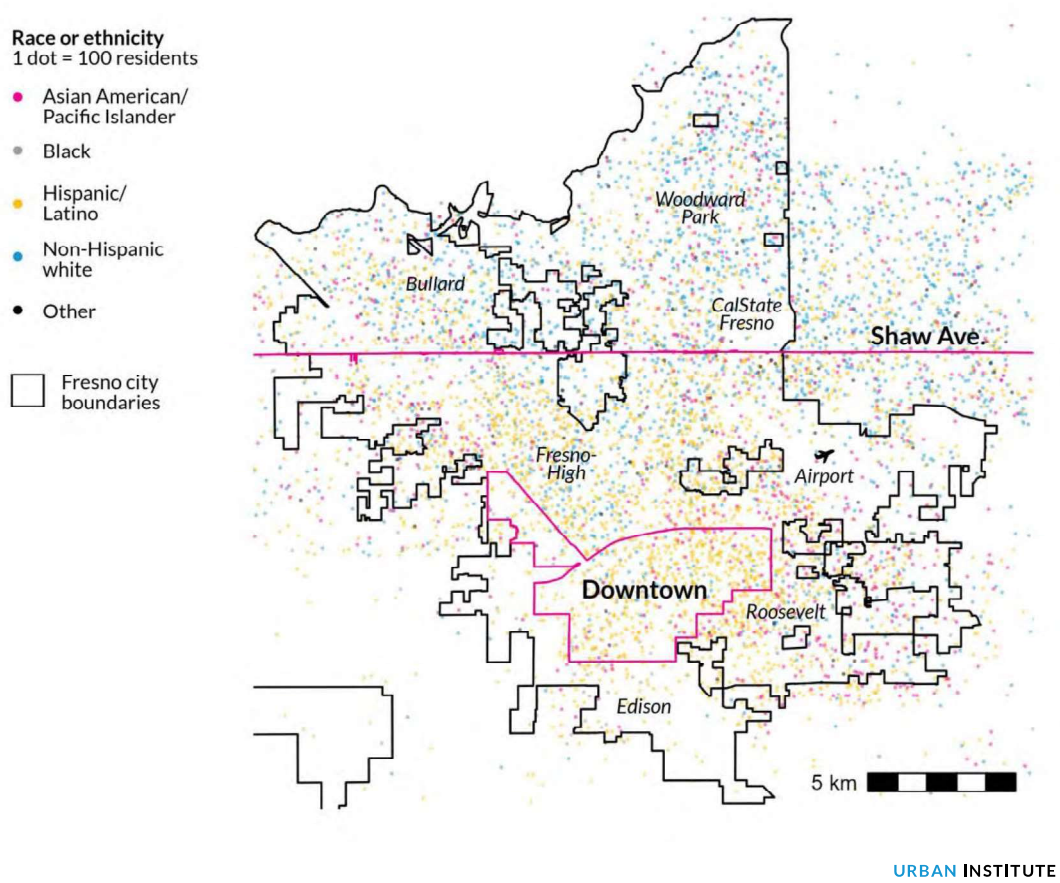
In the city of Fresno, as figure 1 shows, residents in the south and southwest, including in the lower-income neighborhoods surrounding downtown, are primarily people of color. White people tend to be concentrated on the wealthier north side of the city. Fresno's north-south divide is so stark that observers frequently refer to Shaw Avenue, an east-west thoroughfare, as the area's Mason-Dixon line.[11] Notwithstanding these disparities, the city's density is relatively similar across its geography,

with most residential neighborhoods averaging between 5,000 and 10,000 residents per mile. No tract averages more than 4,000 housing units per square mile, and most have between 1,000 and 3,000 units per square mile.

FIGURE 1

Residents of Fresno's Disinvested South and Southwest Neighborhoods are Primarily People of Color

Density of residents in the city of Fresno, by race or ethnicity



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Source: Author analysis, based on American Community Survey 2015–19 five year data, and City of Fresno Community Plan Areas, with OpenStreetMap background.
Notes: White residents are defined as non-Hispanic white. Downtown boundaries as defined by the City of Fresno Community Plans, updated in 2020, found on the Fresno GIS Hub.

One explanation for Fresno's present-day inequities is a legacy of economic decay that has been exacerbated by decades of urban sprawl. Applying a sprawl index to more than 200 of the largest US metropolitan areas, Ewing and Hamidi (2014) found that the Fresno metropolitan area was more

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sprawling than about two-thirds of the nation's large regions. ECONorthwest's analysis further documents how higher-income households have progressively moved from the city core to lower-density areas, primarily in the north, over the last several decades, challenging the city's ability to maintain investment in previously developed areas and resulting in numerous negative economic, health, and environmental outcomes.[12] Yet there has not yet been a detailed analysis of how patterns of sprawl have changed in the region over time, including in terms of their impacts on environmentally sensitive areas and implications for communities of color; this is the gap we attempt to fill here.

Understanding the present circumstances of the Central San Joaquin Valley—and how they came to be—is especially important in light of the region's present opportunity to forge a new path. The state is planning a high-speed rail system to link the Bay Area and Los Angeles, which will include a high-speed rail station in downtown Fresno.[13] The state also recently committed millions of dollars of funding for infrastructure improvements downtown.[14] These investments have the potential to help revitalize neighborhoods that have historically been neglected in favor of suburban and exurban development. However, to ensure that these investments benefit Fresno's most disadvantaged communities, stakeholders in the region must first have a common understanding of historical patterns of development and their consequences.

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In this report, we detail those patterns and illustrate the consequences of the region's sprawling development by offering an alternative history in which less sprawl could have occurred. This comparison enables us to consider what the region could have looked like had it pursued a different development pattern, and it suggests what the region could look like in the future if it changes its trajectory. We conclude by exploring present-day tensions in the region, and suggest that to confront harmful historical development patterns and move beyond sprawl toward more equitable and sustainable outcomes, stakeholders in Frenso must first build consensus on the specific local drivers of sprawling development, including by asking who benefits and who is harmed.

Measuring Patterns of Sprawl in the Central San Joaquin Valley

We developed a research agenda focused on evaluating how housing conditions have changed over time in Fresno and the broader Central San Joaquin Valley. Our primary goal was to identify where new housing growth occurred over the past 80 years and to compare that growth with existing patterns of settlement.

Research Questions

We explore changes in housing conditions in the region by answering three questions:

1. What patterns of urban growth have Fresno and the Central San Joaquin Valley region followed since 1940? Have there been periods of increasing sprawl or increasing infill development during that period?
2. How do patterns of growth compare with the residential locations of people of color and people with low incomes? In other words, has development concentrated in areas that feature specific demographic characteristics?
3. Has growth been associated with the destruction of environmentally sensitive areas and reduced access to public transportation?

Data

To investigate these questions, we collect a series of data that enable us to explore the relationships between geography and new housing development. We examine two levels of geography: first, Fresno County (which is coterminus with the local Fresno Council of Governments, the federally designated metropolitan planning organization) and, second, the broader Central San Joaquin Valley region, which also encompasses Kings, Madera, and Tulare Counties (which contain the cities of Hanford, Madera, Tulare, and Visalia, among others). We selected this larger geography in consultation with local stakeholders, and with reference to regional collaboration between the four counties, including through the California Jobs First program (formerly known as the Community Economic Resilience Fund).[15]

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The key data source we use to examine changes in housing availability is the Historical Housing Unit and Urbanization Database 2010 (HHUUD10).[16] The HHUUD10 estimates housing units by census tract across the United States between 1940 and 2019. The advantage of the HHUUD10 data is that it uses standardized geographies (with 2010 tract limits) and provides information at the tract level nationwide at an earlier date than available in standard census datasets. For each tract in our analysis, we collect data on the number of housing units at the beginning of each decade from 1940 to 2010, as well as in 2019, and also calculate the housing unit densities (units per square mile) for each of those points in time. We collect data for the Central San Joaquin Valley, but also for several comparable locations elsewhere in the United States, in order to construct an alternative history of land development.

Second, we amass census data at the tract level on income, race, and ethnicity for 1980, 1990, 2000, 2010, and 2019. For data from 1980 to 2000, as well as 2019, we use areal interpolation to estimate

tract-level data at the 2010 tract geometries.[17] These data are useful because they enable us to compare trends in housing growth (or decline) with neighborhood demographics. This can thus provide information about whether housing development is more likely in certain neighborhoods than others.

Third, we collect data on land utilization from the National Land Cover Database for 2001 to 2021.[18] These data classify land into more than a dozen categories based on satellite images. The categories include barren land, forested land, planted or cultivated land, developed land, and more. To perform spatial analysis on these data, we convert raster images into vector layers, then determine land change at the tract level.

Finally, we assemble data on the location of bus stops throughout the Central San Joaquin Valley region and several similar areas elsewhere in the country from the National Transit Map.[19] We use this point-based information to assess the degree to which housing units are located within easy access to public transportation options.

Methods

To evaluate how patterns of urban growth have changed, we begin by developing a measure for a tract becoming "urbanized," meaning sufficiently built up or developed to no longer be agricultural or natural. Because we do not have historical information about land cover before 2001, we use housing-unit densities as the metric for evaluating this, as they are a proxy for development. That said, there is no consensus definition of an urbanized tract. Theobald (2005) defines "urban" as more than 4 units per acre (equivalent to more than about 2,500 housing units per square mile) and "suburban" as between 0.6 and 4 units per acre (about 381 to 2,590 housing units per square mile). Vogler and Vukomanovic (2021), on the other hand, define "urban" as more than about 1 unit per acre (about 640 housing units per square mile), and suburban as between 0.1 and 1 unit per acre (about 65 to 654 housing units per square mile). In their book on housing density that leverages field photography of settlement patterns in the United States, Campoli and MacLean (2007) find real-world density levels of between 0.5 and 134 units per acre (320 to 85,760 units per square mile) in neighborhoods within metropolitan areas.

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Given the lack of consensus about the measurement of housing density, there is no single mechanism to identify when a tract becomes urbanized. But identifying when a tract becomes newly urbanized is an important element of our analysis because it allows us to examine trends of infill versus greenfield construction. It enables us to determine whether new construction occurs in neighborhoods that already have many homes in them.

We tested four potential measures of a tract becoming newly urbanized, from 320 units per square mile (the low point of Campoli and MacLean's 2007 findings) to 1,500 units per square mile (much higher than Vogler and Vukomanovic's 2021 definition of suburban). In each case, we evaluated growth trends before and after tracts reached that development density. In an examination of tracts that reached a variety of density thresholds in the 1970s, we find large growth rates in that decade (i.e., from 1970 to 1980), followed by small growth rates in the following decade (1980 to 1990) and then relative statis in later periods (1990 and after; see appendix figure A1). These trends held regardless of which density threshold we tested (appendix figures A2–A5).

Ultimately, we define "urbanized" as a tract having a minimum density of 1,000 housing units per square mile (about 1.5 units per acre). A tract becomes newly urbanized when it reaches that density threshold for the first time in a certain decade. Being newly urbanized during a decade does not necessarily mean that the tract underwent its peak level of development during that period, but we find that this is the period in which a tract makes the transition from being largely rural in character to being largely suburban or urban. We describe a tract that reaches 1,000 units per square mile for the first time in 1980, for example, as newly urbanized in the 1970s (figure 2 illustrates a prototypical example of how we conduct this analysis). We refer to tracts that do not ever meet this threshold as "sparsely developed." This is admittedly a simplified approach to measuring tract development. But it helps enable us to explore patterns of infill and greenfield growth over the decades in the Central San Joaquin Valley.

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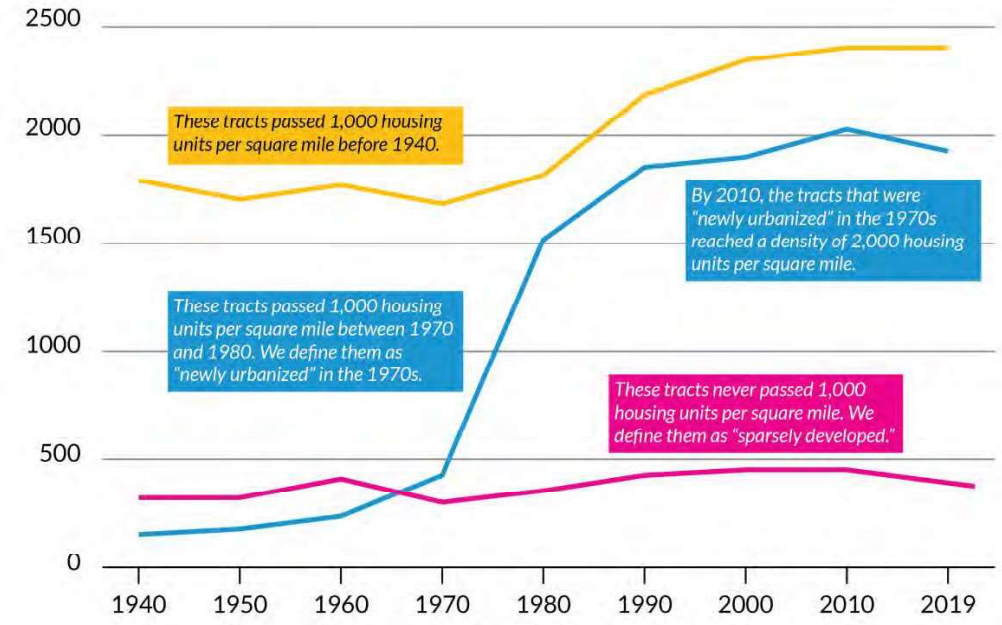
FIGURE 2

An Example of How We Define Tract Development over Time

Housing unit density per square mile



Source: The authors.

We separate the tracts across the four-county region into buckets based on the decade during which we estimate they became newly urbanized. Table 1 shows the number and square miles of tracts by the decade when they became newly urbanized. For example, there were 16 tracts in Fresno County encompassing 11.5 square miles that reached the minimum density of 1,000 units per square mile for the first time in the 1960s (adding to the 26.8 square miles of land that had already been urbanized by 1960); this means that, by 1970, there were a total of 38.3 square miles of tracts that had urbanized. A majority of land in the region remains sparsely developed (it is largely agricultural or mountainous, as we show below), but the data in table 1 make clear the continuous expansion of the region over time.

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CONT

TABLE 1

Tracts, by Decade When Newly Urbanized

Fresno, Kings, Madera, and Tulare Counties, California

	Four Counties			Fresno County		
Decade tract became newly urbanized	Newly urbanized tracts	Newly urbanized square miles	Cumulatively urbanized square miles	Newly urbanized tracts	Newly urbanized square miles	Cumulatively urbanized square miles
Before 1940	21	14.83	14.83	17	11.20	11.20
1940s	12	7.76	22.59	7	3.79	14.99
1950s	20	12.30	34.89	19	11.78	26.77
1960s	22	16.20	51.09	16	11.50	38.27
1970s	38	33.77	84.86	24	20.03	58.30
1980s	21	20.95	105.81	13	12.73	71.03
1990s	20	26.30	132.11	12	13.30	84.33
2000s	15	24.72	156.83	9	11.90	96.23
2010s	7	9.91	166.74	6	9.08	105.31
Sparsely developed	151	14,083.45	NA	76	5,823.60	NA
Total	**327**	**14,250.20**	**NA**	**199**	**5,928.90**	**NA**

Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.

Notes: A tract counts as being newly urbanized in a decade if its housing unit density increased from below 1,000 housing units per square mile at the beginning of the decade to above 1,000 at the beginning of the next decade. A tract is sparsely developed if it did not achieve 1,000 housing units per square mile at any time during the study period.

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CONT

Using the tract data, classified by decade of development, we examine trends in housing growth. This can help illustrate, for example, among the cohort of tracts that became newly urbanized in the 1950s, how much additional housing was added in later decades (i.e., how much infill development occurred). It also enables us to document the characteristics of housing conditions in the region. It is worth noting that tracts vary substantially in terms of physical extent. Tracts in the center of Fresno are far smaller geographically than tracts on the rural edge of the region; this can make comparisons between tracts difficult to interpret.

To answer our second research question—the comparison of growth patterns with the demographics of residents by income, race, and ethnicity—we juxtapose housing growth rates over decades between 1980 and 2019 and the demographics of tracts at the beginning of each decade. We specifically focus on tract median household incomes and the degree to which tracts are populated by people of color (in other words, not non-Hispanic white). This can help explain whether certain tracts are more likely to be developed because of the demographics of their residents. To further examine these data, we run a series of regressions that control for several local characteristics to identify the

relationships of income, race, and ethnicity with housing growth. Our goal for these regressions is to test our hypothesis that housing growth has been more likely to occur in tracts with residents who are wealthier, who are more likely to be non-Hispanic white, and who live in less densely populated areas.

Finally, we use land cover data to examine the degree to which development in the Central San Joaquin Valley region has been associated with reductions in agricultural and natural land. We also test the degree to which housing units in the area are located within a reasonable distance of public transportation options, which we define as within a half-mile of a bus stop, as of 2024.

Limitations

There is inconsistent provision of the data we use to investigate patterns of sprawl over the decades we examine. For example, while we are able to explore the distribution of housing units by tract between 1940 and 2019, we were only able to consider local demographic data from 1980 to 2019; land cover data from 2001 to 2021; and transit information from 2024. This could limit the usefulness of our analysis because it is possible that there were different trends at play related to demographics or transit access during periods that predated the 2000s, for example.

The approach we use to study sprawl is limited by our use of a metric for housing development by tract, which provides information only on residential construction, not on commercial or industrial uses. Moreover, while agricultural uses sometimes produce considerable and negative environmental impacts—such as methane emissions and polluted runoff—we do not attempt to measure those impacts in this analysis.

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CONT

Finally, it may not be appropriate to generalize our findings to other parts of the United States. Fresno is located in the heart of a major agricultural area, has a population with a large percentage of people of color, and has a challenged economy. Other metropolitan areas face different trends that produce different outcomes. Additional research would be useful to help reinforce our findings related to the patterns of sprawl in Fresno and the broader Central San Joaquin Valley region and compare these patterns with those experienced elsewhere in the nation.

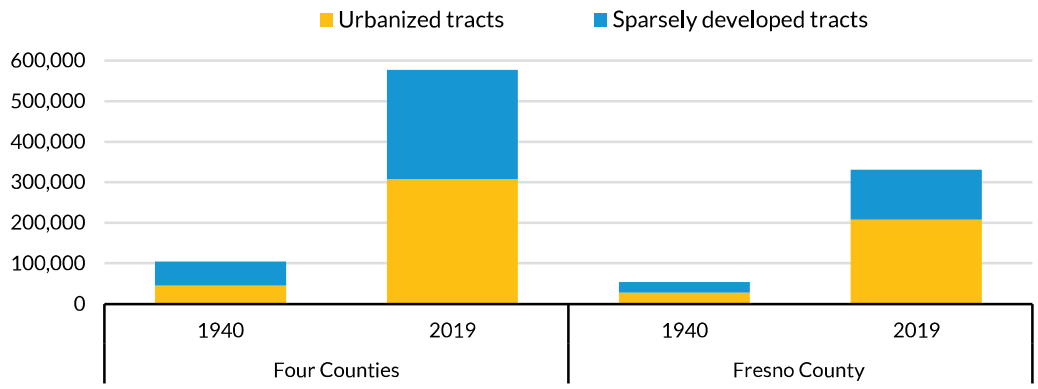
Decades of Unabated Sprawl in the Central San Joaquin Valley

Between 1940 and 2019, the Central San Joaquin Valley grew rapidly, adding almost 500,000 housing units, of which about half were located in Fresno County (figure 3). Overall, the share of the region's housing units that are located in tracts with housing densities of above 1,000 units per square mile ("urbanized") grew between 1940 and 2019. Nonetheless, in 2019, about 47 percent of the housing units in the region overall—and 37 percent in Fresno County—were located in sparsely developed tracts with fewer than 1,000 housing units per square mile. These homes are located in areas that are largely rural in character.

FIGURE 3

A Large Share of Housing Units in the Central San Joaquin Valley Are in Sparsely Developed Tracts

Number of units, by tract density



URBAN INSTITUTE

Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.
Notes: Four counties are Fresno, Kings, Madera, and Tulare, California. Sparsely developed = fewer than 1,000 housing units per square mile; Urbanized = greater or equal to 1,000 housing units per square mile.

Though growth has continued across the region over the entire study period, the 1970s were arguably the high point for regional development trends. A plurality of housing units in the region are located in tracts that were newly urbanized during that decade (appendix table B1). We illustrate the importance of the 1970s in producing additional housing stock in figure 4. Between 1970 and 1980 alone, approximately 30,000 housing units were added in the cohort of tracts that became newly

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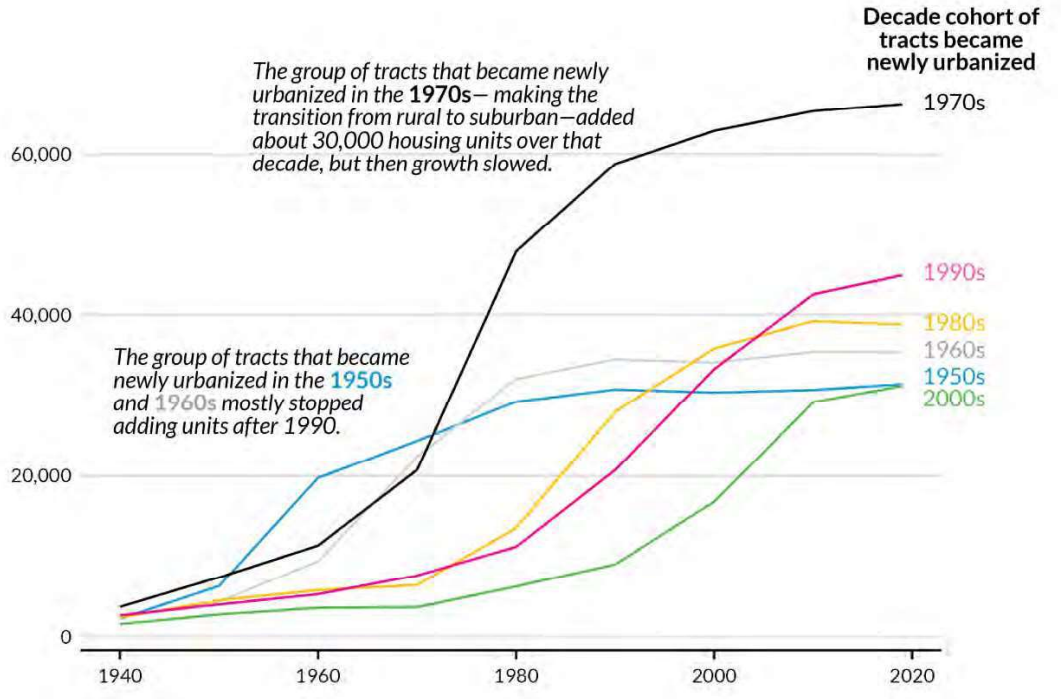
CONT

urbanized during that decade. Subsequent waves of housing growth in the 1980s, 1990s, and 2000s have been slower.

FIGURE 4

The 1970s Were a Decade of Remarkable Growth in Housing Availability in the Central San Joaquin Valley

Housing units by decade tracts became newly urbanized, Fresno, Kings, Madera, and Tulare Counties, California



URBAN INSTITUTE

Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.
Notes: We define a tract as newly urbanized in a given decade if its housing unit density increased from below 1,000 units per square mile at the beginning of the decade to above 1,000 at the beginning of the next decade. We do not show housing units in tracts that we define as sparsely developed (with densities of less than 1,000 housing units per square mile during all periods of our analysis). This figure can be read as follows: The black line on this chart shows the number of housing units in the cohort of newly urbanized tracts in the 1970s, over time. These tracts contained about 20,000 units in 1970, growing to almost 50,000 units by 1980. These tracts grew more slowly in the following decades, reaching just under 60,000 total units in 1990.

We illustrate these sprawling patterns of development in figures 5 and 6, which map decades of housing development. Both figures demonstrate that the patterns of outward development, while most apparent around the city of Fresno, are also visible for other regional cities like Hanford, Madera,

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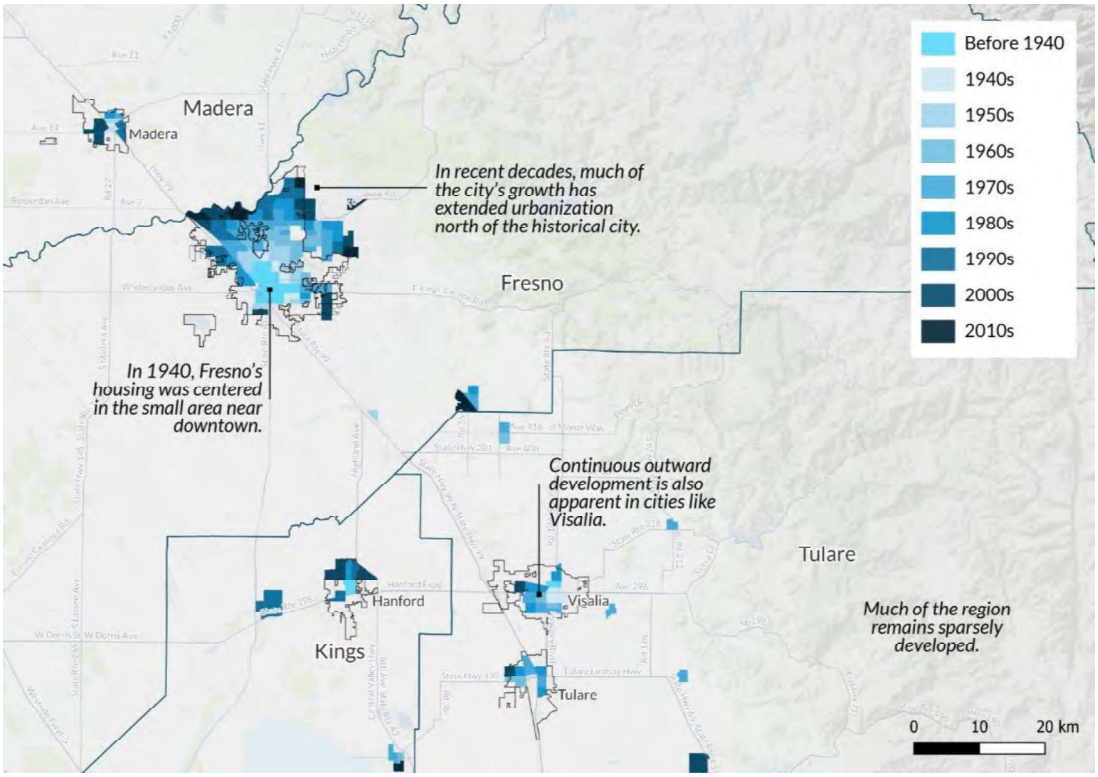
CONT

Tulare, and Visalia, suggesting that suburbanization trends are common across the Central San Joaquin Valley.

FIGURE 5

Most of the Four-County Region Remains Undeveloped, But Patterns of Sprawl Are Apparent Around All Major Cities in the Central San Joaquin Valley

Decade tracts became newly urbanized, Fresno, Kings, Madera, and Tulare Counties, California



URBAN INSTITUTE

Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010, with OpenStreetMap background.

Notes: A tract counts as being newly urbanized in a decade if its housing unit density increased from below 1,000 housing units per square mile at the beginning of the decade to above 1,000 at the beginning of the next decade. We do not show tracts that we define as sparsely developed (with densities of less than 1,000 housing units per square mile during all periods of our analysis).

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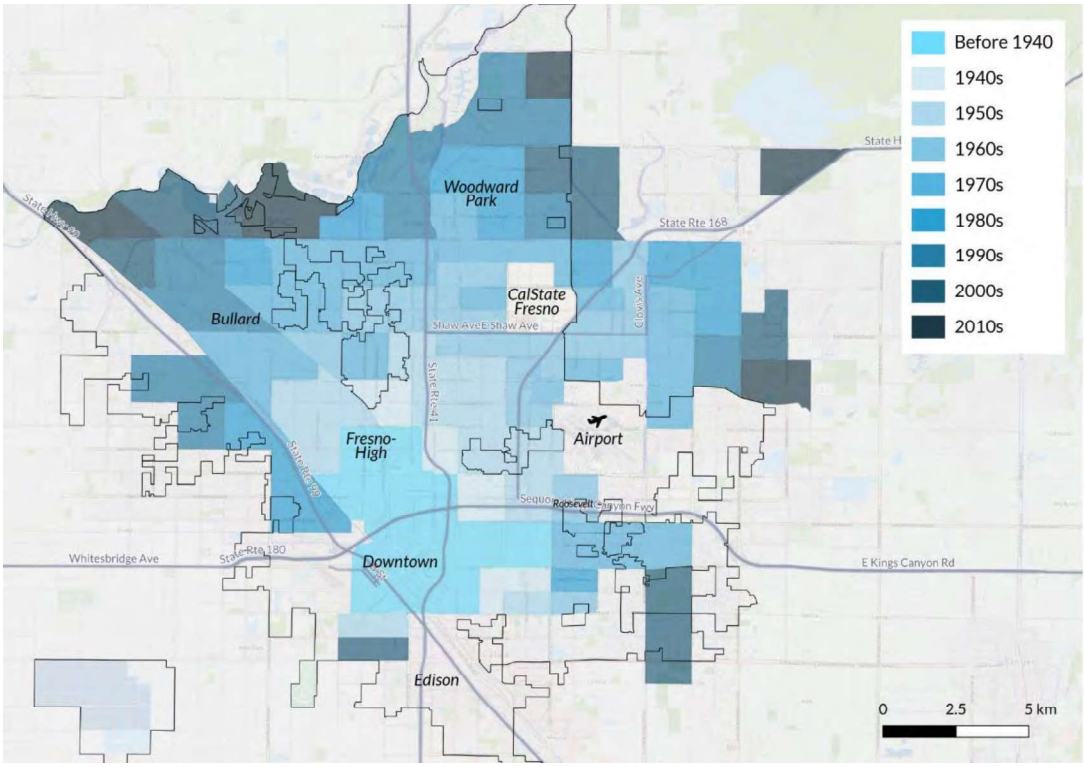
FIGURE 6

Fresno's Growth Since the 1940s Has Moved North over Time

Decade tracts became newly urbanized, city of Fresno and surrounding areas



URBAN INSTITUTE

Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010, with OpenStreetMap background.

Notes: A tract counts as being newly urbanized in a decade if its housing unit density increased from below 1,000 housing units per square mile at the beginning of the decade to above 1,000 at the beginning of the next decade. We do not show tracts that we define as sparsely developed (with densities of less than 1,000 housing units per square mile during all periods of our analysis).

The region's housing sprawl has been matched by the City of Fresno's policy of continuously annexing its suburban areas, which expands the provision of local services, such as police and fire, to new land. Indeed, between 1940 and 2023, the city's jurisdictional boundaries expanded from 9.54 square miles to 117.30 square miles (figure 7). The city's physical expansion has been faster than its population growth; as a result, the municipality's population density declined from 6,361 people per square mile in 1940 to 4,642 people per square mile in 2020, even though the city's population expanded from 60,685 to 542,107 over that time.

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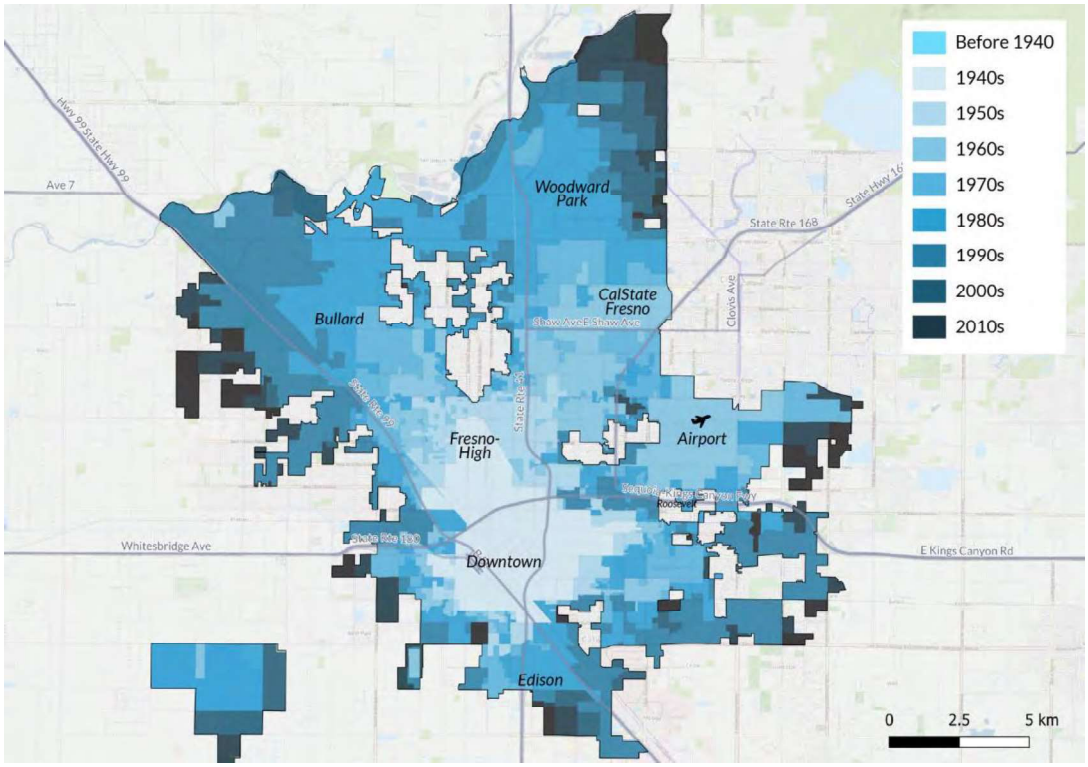
FIGURE 7

Fresno's Annexation Has Followed the City's Outward Growth

Decade land was annexed by the City of Fresno



URBAN INSTITUTE

Source: Author analysis, based on the City of Fresno Annexation map, with OpenStreetMap background.
Notes: The City of Fresno has, at times, annexed land disconnected from the primary city geography; it has also left portions of land unannexed that are entirely encircled by incorporated land.

One key explanation for why housing development in Fresno and the Central San Joaquin Valley has continued to extend out from historical urban centers is that most neighborhoods stop densifying—meaning, no more units are built there—once they reach a certain density level. We illustrate this phenomenon for tracts that became newly urbanized in the 1960s in figure 8. Before 1960, these tracts were largely rural in character; they then grew quickly in the 1960s and 1970s. But in the 1980s, their densification slowed markedly, before coming to a halt after 1990. Since 1990, this group of tracts (there are 22 in the region, according to table 1) has remained at a roughly constant density of about 2,200 housing units per square mile. In other words, upon reaching this point, these neighborhoods entered into a sort of stasis of their built environment.

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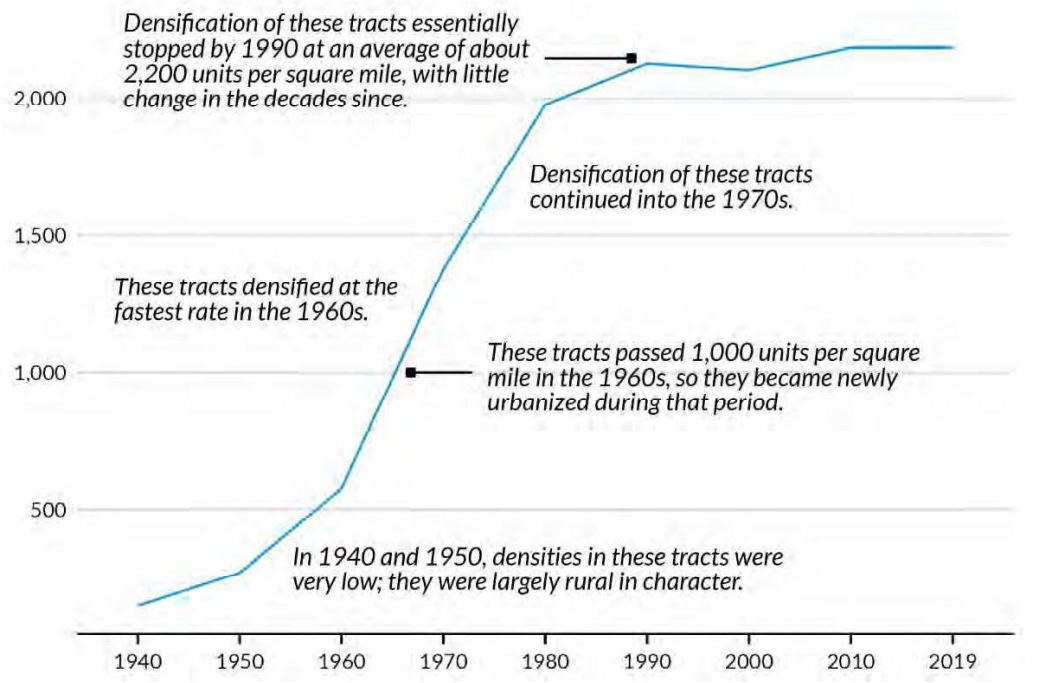
CONT

FIGURE 8

Tracts That Became Newly Urbanized in the 1960s Stopped Densifying after 1990

Housing unit density among tracts that became newly urbanized in the 1960s, Fresno, Kings, Madera, and Tulare Counties, California



URBAN INSTITUTE

Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.
Notes: A tract counts as being newly urbanized in a decade if its housing unit density increased from below 1,000 housing units per square mile at the beginning of the decade to above 1,000 at beginning of the next decade.

This trend of fast-paced neighborhood development followed by relative stasis in densification applies generally, no matter when tracts became newly urbanized (figure 9). Tracts developed across decades from the 1940s through 1980s all reach what appears to be a maximum density—about 1,800 to 2,500 housing units per square mile—several decades after first becoming what we define as newly urbanized. Once reaching these density levels—the density of a community that is primarily made up of single-family homes with small yards (i.e., typical suburban subdivisions)—neighborhood growth typically stalls. For example, the cohort of tracts newly urbanized before 1940 in the Central San Joaquin Valley has remained at about the same housing density since 1950, meaning the tracts have not accommodated infill development. Tracts that were newly urbanized in the 1950s reached that average density by 1990; those newly urbanized in the 1980s reached that point by 2010 on average. At this rate, tracts newly urbanized in the 1990s could reach that density stasis point by 2030.

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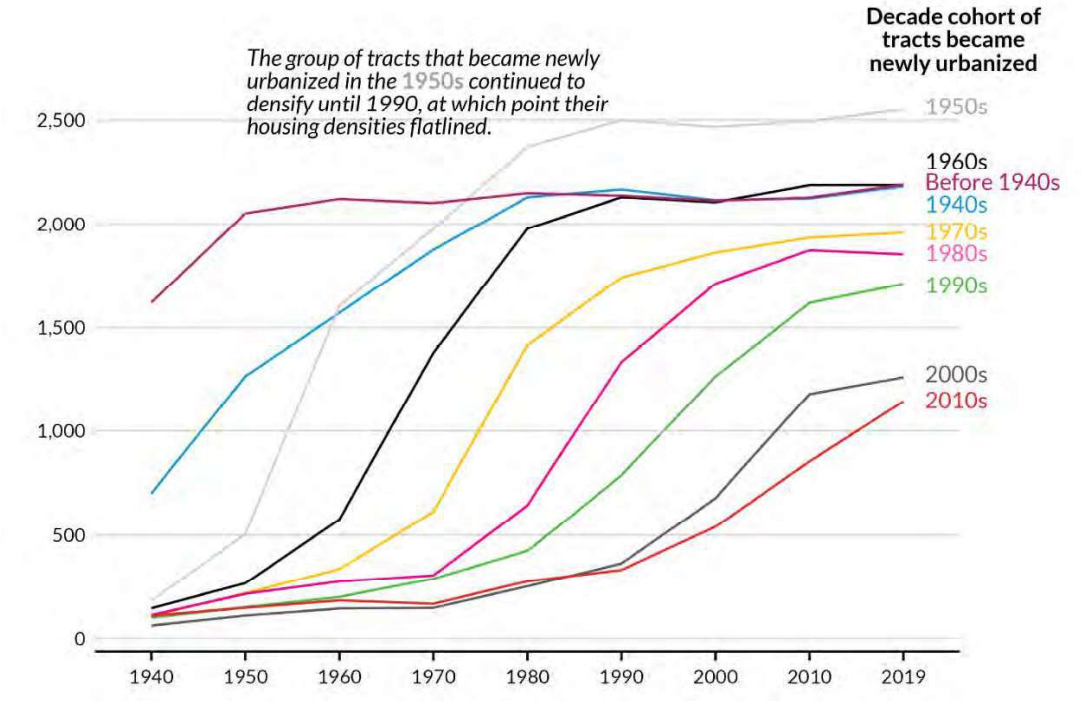
FIGURE 9

Neighborhood Housing Densities Max Out at 1,800 to 2,500 Units Per Square Mile, across Decades

Housing unit density by decade tracts became newly urbanized, Fresno, Kings, Madera, and Tulare Counties, California



URBAN INSTITUTE

Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.
Notes: A tract counts as being newly urbanized in a decade if its housing unit density increased from below 1,000 housing units per square mile at the beginning of the decade to above 1,000 at beginning of the next decade.

It appears that the point at which neighborhood density stasis sets in—the density at which little infill housing is added—has been declining. Neighborhoods newly urbanized in the 1950s reached a density of about 2,500 units per square mile; those newly urbanized in the 1960s reached about 2,200 units per square mile. Those newly urbanized in the 1980s reached 1,800 units per square mile in 2010—before declining slightly by 2019. That said, future growth patterns may alter these outcomes over time. And more evidence is needed to evaluate growth trajectories in these areas; for example, neighborhoods newly urbanized in the 1970s appear to be still slowly increasing their housing densities.

The data in figure 9 suggest that the region's development has followed a consistent path, decade to decade: a new area is identified for development, investors build it up over three to four decades, the area reaches a stasis level of density, and then construction ceases. At 1,800 to 2,500 housing units per

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square mile, a neighborhood enters a housing-development plateau, at which point infill development rarely occurs. Developers then repeat the cycle, finding greenfield land to develop, which is the preferred alternative for adding new housing. The result, as we noted earlier, is that new housing consumes land at a faster rate than population growth.

We identify similar trends when we use a variety of different measures of a tract becoming newly urbanized (appendix A). For example, examining tracts that reached 640 housing units per square mile in the 1960s, we find that the tracts reach a density stasis of about 2,200 units per square mile by 2010; examining tracts that reached 1,500 units per square mile in the 1960s, we find that the tracts reach a density stasis of about 2,200 units per square mile in 1980 (see appendix figures A3 and A4). That said, the ultimate density reached depends on how we define achieving newly urbanized status, with a lower new urbanization specification associated with lower housing densities over the long term (appendix figure A1).

When we examined housing unit growth in Fresno County, we found that in each decade since at least the 1940s, 30 percent or less of the additional housing has been in tracts that were already urbanized at the beginning of the decade (figure 10). In other words, 70 percent or more of additional housing has been in tracts that were either newly urbanized in the same decade (meaning they pass the 1,000 units per square mile threshold by the beginning of the next decade), or in tracts that were sparsely developed (meaning the growth is on rural land). Infill development has played only a minor role in the region's patterns of housing development.

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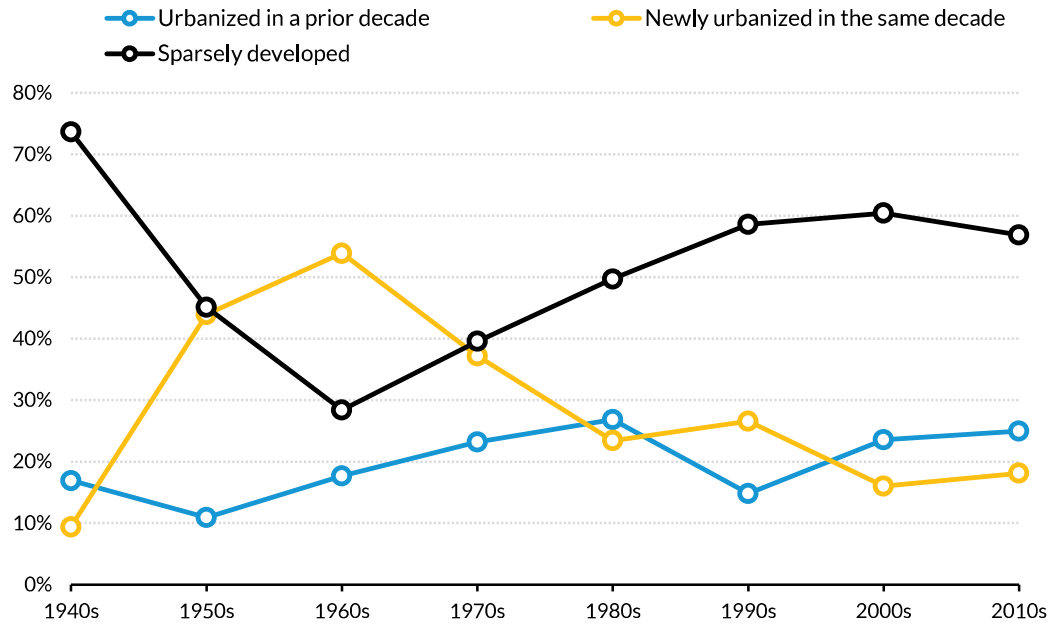
FIGURE 10

The Character of Housing Development in Fresno County Is Outward Sprawl

Share of additional housing added during decade, by tract urbanization status



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Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.
Notes: We categorize housing units as being newly urbanized in the same decade if the density of the census tract they are located in increased from below 1,000 housing units per square mile at the beginning of the decade to above 1,000 at the beginning of the next decade. Conversely, we categorize housing units as urbanized in previous periods if the census tract that they are located in reached a density of more than 1,000 housing units per square mile in a previous decade. The 2010s period includes data from 2010 to 2019.

One explanation for these outcomes may be the zoning codes used by jurisdictions in the Central San Joaquin Valley. Zoning that prohibits new construction of multifamily housing may be limiting increases in housing density in infill zones. Although the City of Fresno adopted a new zoning code in 2015 that allowed for greater densities downtown and along major corridors, historical restrictions on density may be one explanation for Fresno's sprawling growth from the 1940s onward. It is also likely that the zoning codes outside of the city of Fresno are more restrictive, though we do not examine them in this report.

Even so, zoning is unlikely to be the only explanation for the continued sprawl of the region. Developers may prefer to build new homes in lower-density areas, particularly if land is cheaper on the metropolitan edge; demand for larger suburban single-family homes may outweigh demand for

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CONT

apartments in more central neighborhoods (and may be more profitable for developers to construct than other types of units); and there may be other private or public incentives (such as insufficiently high development impact fees) that subsidize sprawl at the expense of infill development. Additionally, many new developments nationwide have been constructed as homeowners' associations that manage building projects within their boundaries, many of which are gated (Clarke and Freedman 2019). Homeowners' associations limit new construction and often prevent the addition of new projects, such as apartments, that do not comply with their rules.[20]

Development Is More Common in Low-Density, Higher-Income Neighborhoods

We next examine whether the sprawling pattern of housing development in the Central San Joaquin Valley is purely a result of focusing development in areas that had previously been occupied by agricultural uses and nature, or whether it is also the product of trends related to resident demographics. As noted earlier, lower-income communities in the United States have historically faced challenges attracting investment. And people of color are more likely to live in such neighborhoods.

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CONT

We examine whether those associations hold up in the context of the Central San Joaquin Valley by running regressions of housing growth over each decade from 1980 to 2019 among tracts in Fresno County to evaluate the relative influence of neighborhood-level incomes, racial demographics, population densities, and location over time (table 2). We find that, once controlling for those other factors, majority-white tracts did not experience higher rates of development. On average in the most recent period, these tracts had slightly less development than majority nonwhite tracts, but the difference was not statistically significant.

TABLE 2

Housing Growth Was Once Associated with Higher Incomes, but Development on Rural Land Has Become Increasingly Prominent

Housing growth, Fresno County tracts, using scaled variables

	1980–90	1990–2000	2000–10	2010–19
Median household income (log)	0.28 ** (0.10)	0.38 ** (0.13)	0.20 * (0.09)	0.07 (0.14)
Majority white tract (dummy)	0.04 (0.05)	−0.14 * (0.06)	0.05 (0.07)	−0.02 (0.09)
Population density per square mile	−0.28 ** (0.09)	−0.24 *** (0.07)	−0.36 *** (0.09)	−0.39 ** (0.13)
Distance from center (log)	−0.15 * (0.08)	−0.11 (0.07)	−0.21 * (0.09)	−0.27 (0.15)
Constant	0.00 (0.07)	0.00 (0.07)	0.00 (0.07)	0.00 (0.07)
Observations	177	177	177	177
R-squared	0.13	0.17	0.14	0.10

Source: Author's analysis of the Historical Housing Unit and Urbanization Database 2010 and Decennial Census data, 1980–2019.

Notes: ***p<0.001, **p<0.01; *p<0.05. Robust standard errors are shown in parentheses. Tract counts as majority white if their non-Hispanic white population accounted for more than 50 percent of the population at the beginning of the period. Median household income and population density are both calculated at the beginning of the relevant decade. Distance from center of region is calculated as the distance of the centroid of each tract from Court Park in downtown Fresno. We identify similar trends in conducting these regressions across the entire Central San Joaquin Valley (not shown).

This implies that race and ethnicity is not the major intervening factor explaining housing growth in Fresno. Far more influential in explaining change over time is household income, especially up until 2010. Tracts with higher resident incomes attracted a statistically significantly higher rate of new housing in the 1980s, 1990s, and 2000s. This indicates that development patterns are tracking families with the ability to afford new units. Our regressions also show that, consistently and statistically significantly, housing growth is higher in tracts with lower population densities, as we documented in the previous section. Interestingly, development also declines on average with distance from the center, suggesting interest from developers to add units near downtown, as long as the preexisting population densities are low and incomes are high.

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CONT

Most of the Region Remains Natural in Character, but There Have Been Recent Losses to Agricultural and Developed Uses

The sprawling patterns of housing development that we have demonstrated above have affected the environment of the region. In Fresno County—and even more so across the Central San Joaquin Valley region as a whole—the majority of land remains only sparsely developed. The majority of tracts have

housing densities below 1,000 units per square mile (table 1). As of 2021, 34 percent of land in Fresno County was used for agricultural purposes, with 60 percent remaining "natural" in character, according to the Multi-Resolution Land Characteristics Consortium.[21] Much of that land is permanently protected by federal ownership, such as through Kings Canyon National Park and Sierra National Forest. But agricultural and natural uses have become less common over the past two decades.

Since 1940, we find that the number of developed square miles in the Central San Joaquin Valley region increased tenfold, using multiple measures of urbanization (figure 11). Our estimate is that between 2000 and 2019, 34.6 square miles of land transitioned from sparsely developed to newly urbanized, using the 1,000 housing units per square mile definition of urbanization; this was on top of the 81 square miles that made that transition between 1970 and 2000. Overall, there was a 226 percent increase in the region's urbanized land area, compared to a 153 percent population increase. This expansion of urbanized area has had substantial impacts on agricultural and natural land uses.

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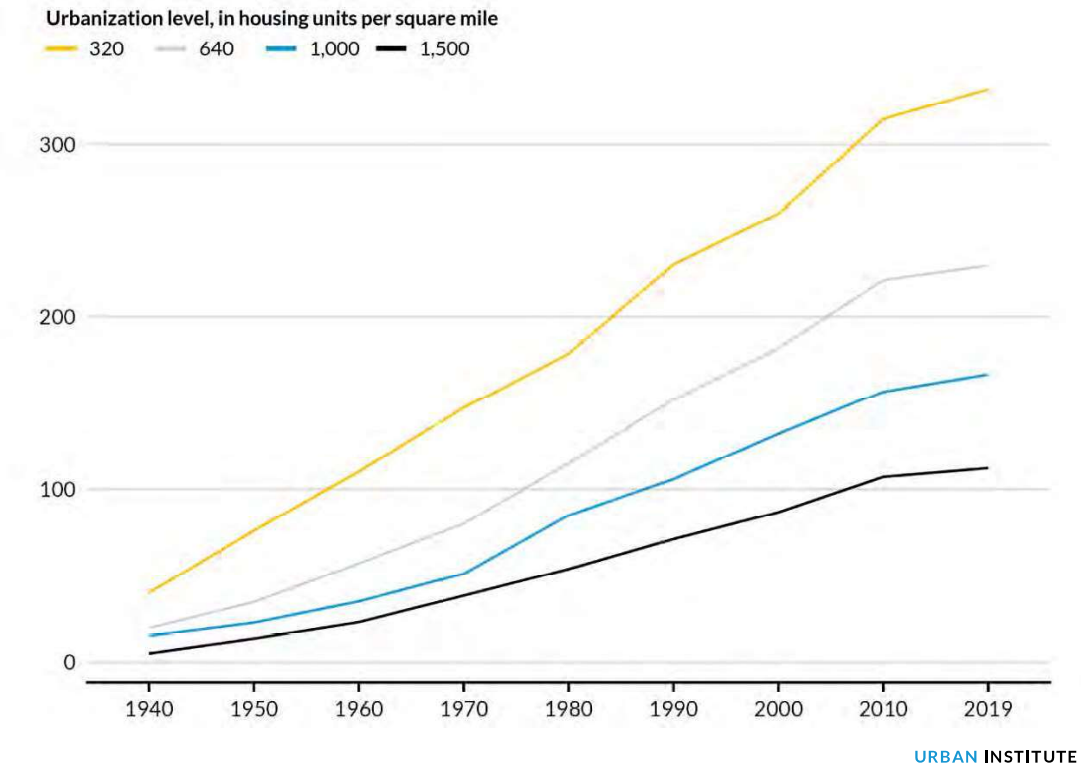
FIGURE 11

Development in the Central San Joaquin Valley Region Has Expanded Dramatically Since the 1940s

Urbanized land area (square miles) across the four-county region



Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.
Notes: Includes tracts within Fresno, Kings, Madera, and Tulare Counties, California.

Figure 12 illustrates that between 2001 and 2021, Fresno County lost a net 38.67 square miles of land to what the National Land Cover Database defines as development (the database's definitions are related, though different, than those we use for our analysis above, since they rely on satellite images to assess land use, rather than housing unit densities). Most of the land developed had previously been used for agriculture in the form of cultivated crops (31 square miles of agricultural land), but some of the land was previously forests, shrublands, and grasslands.

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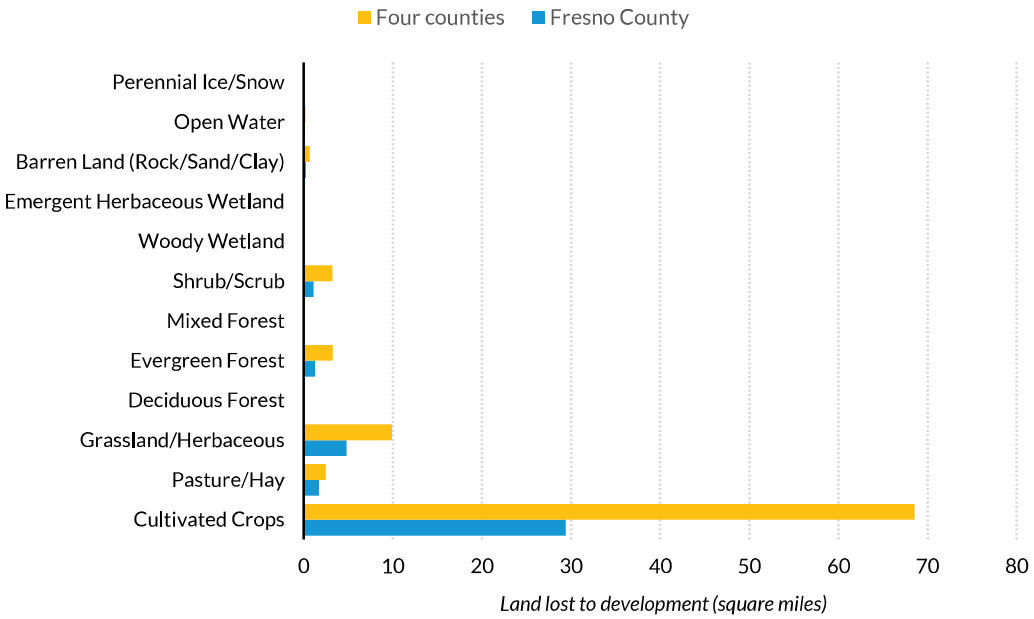
FIGURE 12

The Majority of Land Lost to Development in Fresno and the Central San Joaquin Valley over the Last Two Decades is Agricultural Land

Land lost to development, by land cover class, Fresno County and four-county region, 2001–21



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Source: National Land Cover Database Enhanced Visualization and Analysis tool.
Notes: The National Land Cover Database classifies developed land into one of four categories: developed, open space (defined as areas where impervious surfaces accounts for less than 20 percent of total cover); developed, low intensity (defined as areas where impervious surfaces account for between 20 and 49 percent of total cover); developed, medium intensity (defined as areas where impervious surfaces account for between 50 and 79 percent of total cover); and developed high-intensity (defined as areas where impervious surfaces account for more than 80 percent of total cover). Agricultural land comprises Pasture/Hay and Cultivated Crops land cover classes.

The loss of cultivated cropland to development—which commands higher property values—required finding *new* land to cultivate. After all, the Central Valley is the most productive agricultural zone in the United States and the nation's population continues to grow. Even as Fresno County lost a total of 29.4 square miles of cropland to development between 2001 and 2021, adjacent Madera County added a net 17.5 square miles of cropland. The latter county, in the meantime, lost 26.2 square miles of natural land, mostly to agricultural and developed uses. The overall trend is a staged development process: sprawling development displaces agriculture, which in turn displaces natural lands like forests, many of which provide ecosystem services that are vital for both ecological health and human well-being.[22]

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Consequences of Sprawl and Lost Opportunities for Denser Development

Our analysis above demonstrates that Fresno and the broader Central San Joaquin Valley have experienced a dramatic increase in newly urbanized land over the past few decades, and that this sprawling growth has been associated with a reduction in agricultural and natural land in the surrounding area. Sprawl has also had adverse impacts on the health and economic well-being of Fresno's residents, particularly lower-income residents and residents of color on the south side of the city. A recent analysis of urban decay in Fresno linked the city's present-day symptoms of economic decay—including its concentrated poverty in the south and southwest—to its history of outward sprawl, which has hollowed out core downtown neighborhoods through disinvestment and neglect.[23]

Transit is one of many areas where public investments have failed to keep up with the sprawling growth of housing, in part because it is far more feasible to provide effective public transportation in neighborhoods with higher densities, and because people living in low-density areas are able to access more by car than by walking or transit (Walker 2024). To illustrate this, we examine the degree to which housing in the region is served by public transportation options by comparing the percentage of housing units within a quarter mile of bus stops in the four-county region to several other West Coast counties with more robust public transportation systems (figure 13).

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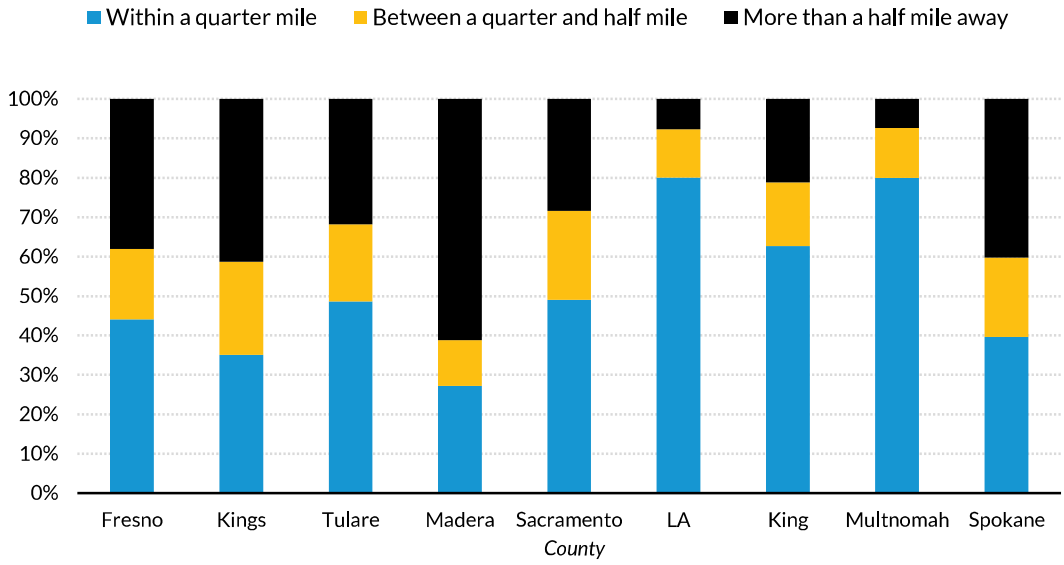
FIGURE 13

The Share of Housing Units Located within a Quarter Mile of Bus Stops Is Smaller in Fresno County than in Other West Coast Counties

Percentage of housing units, based on distance from nearest bus stop, by county



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Source: Author analysis, based on National Transit Map (2024) and American Community Survey 2018–22 five year estimates.
Notes: Uses areal interpolation to estimate housing units located within buffers of transit stations. Bus service may vary tremendously based on the specific stop. Fresno, Kings, Tulare, and Madera Counties are in the Central San Joaquin Valley region, California; Sacramento = Sacramento County, California; LA = Los Angeles County, California; King = King County, Washington; Multnomah = Multnomah County, Oregon; Spokane = Spokane County, Washington.

We find that 44 percent of housing units are located within a quarter mile of bus service in Fresno County, a substantially smaller percentage than in Los Angeles County, Sacramento County, King County, Washington (Seattle), and Multnomah County, Oregon (Portland). While these differences likely reflect relative degrees of urbanization, access to cars, and local political and economic support for transit, they nonetheless have significant implications for residents in the region. Limited access to transportation can restrict opportunities to access jobs, education, and other needs, and evidence suggests that limited access to transit is associated with higher levels of unemployment and lower levels of economic mobility.[24]

Poor transit is the product, in part, of decades of public prioritization of highway investment. It reflects a choice to cater to the needs and desires of residents with higher incomes, particularly those who live in suburban areas. Ineffective transit also worsens racial inequities, as people of color are much

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less likely to have access to personal vehicles than white people, and as a result are much more likely to rely on public transit for commuting and other needs.[25] In the city of Fresno, for example, 25 percent of Black households do not have access to a car, compared to 7 percent of white households.[26]

While the Central San Joaquin Valley's sprawling development is consistent with development in many other parts of the United States, the region's development did not have to occur in this way. Fresno has missed opportunities to create a more vibrant center city while reducing negative impacts on its natural lands and on economically struggling residents.

Consider the Fresno County tracts that were urbanized by 1940, meaning that they had reached at least 1,000 housing units per square mile. Those tracts occupy 11.2 square miles (table 1) and are largely located in the central parts of the city of Fresno. By 2019, those tracts had 24,715 housing units, corresponding to a density of about 2,200 units per square mile—similar to urbanized tracts throughout the region. The number of housing units in those tracts has barely changed since 1950, meaning there has been very little development within them (figure 9).

But could development have proceeded otherwise? We compare Fresno's experience with that of other large counties along the West Coast (figure 14). Among tracts that were urbanized by 1940 in Sacramento County, California, and Spokane County, Washington, housing densities have also been relatively stable over the past few decades, though at higher housing densities than in Fresno County (about 4,000 and 2,700 units per square mile, respectively). Other counties, however, show much more dramatic density increases. Among tracts that were urbanized by 1940 in King County, Washington (Seattle); Los Angeles County, California; Multnomah County, Oregon (Portland); and San Diego County, California housing densities have dramatically increased over the last few decades . In King County, for example, densities in those tracts have now reached about 6,500 units per square mile.

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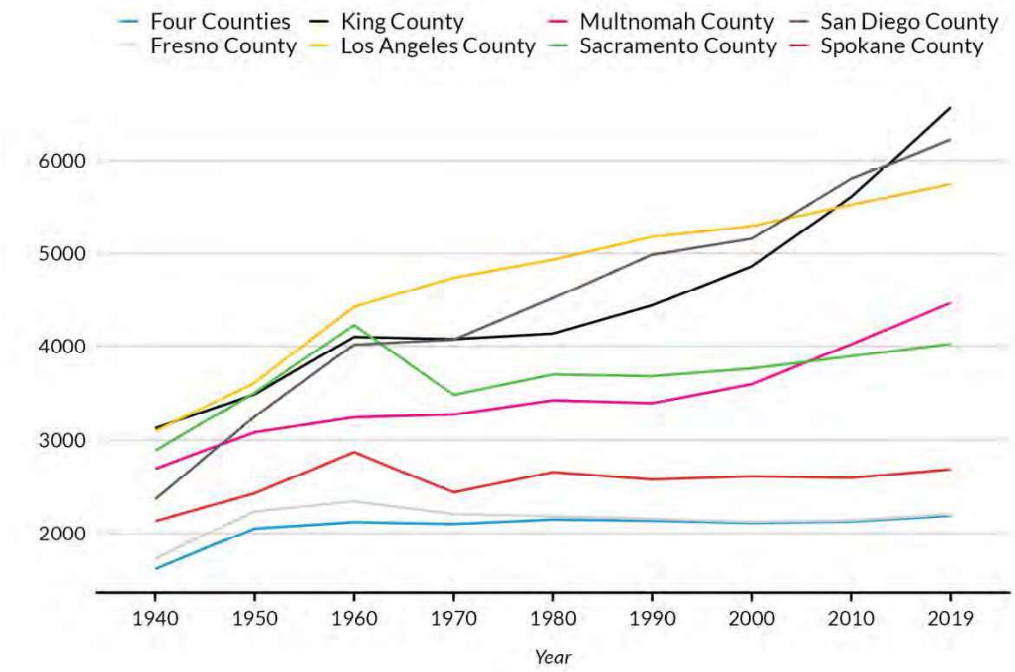
FIGURE 14

Other West Coast Counties Have Experienced Dramatic Increases in Already-Urbanized Areas, Compared to Fresno County and the Central San Joaquin Valley Region

Housing unit density in tracts urbanized by 1940, by county



URBAN INSTITUTE

Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.
Notes: Tracts are considered urbanized by 1940 if they had densities of at least 1,000 housing units per tract in 1940. Portland and Seattle are located in Multnomah and King Counties, respectively.

What if Fresno County had followed a similar path as the other counties presented in figure 14? Had the tracts that urbanized by 1940 in Fresno reached the densities of those in Sacramento County, they could accommodate about 45,000 housing units, compared to the about 25,000 units that are currently there. Had they reached those in King County, Washington, they could accommodate about 73,000 housing units: almost triple the current development densities in the central, historic parts of the region and about 48,000 more housing units than currently exist. Admittedly, this comparison is difficult to make; Fresno has a different economy than the other counties profiled and has not attracted the same new investment as cities like Portland and Seattle. Nonetheless, this comparison shows what is theoretically possible—and what a future Fresno could look like.

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We calculate that about 39,000 housing units were added in the almost 30 years between 1990 and 2019 in tracts across Fresno County that we classify as becoming newly urbanized in the intervening decades. Those tracts occupy about 34 square miles of land (table 1), likely previously used for agriculture or reserved for nature. In other words, the entirety of Fresno County's housing growth from 1990 to 2019 could have been concentrated in downtown Fresno rather than sprawling out into sparsely developed land. This would have had important impacts in terms of preserving local ecologies.

What social and economic implications would there have been had those 39,000 housing units—which collectively housed more than 80,000 residents—been constructed in the downtown core rather than on the exurban edge between 1990 and 2019? Consider, first, vehicle miles traveled. Research by Zhang et al. (2012) implies that a population density increase from about 4,000 people per square mile (a bit lower than the average tract density in Fresno County) to about 13,000 people per square mile (similar to the levels in tracts urbanized by 1940 in King County, Washington) is associated with a 26.5 percent reduction in vehicle miles traveled. On average, Californians travel about 8,700 miles per capita every year; if this had been reduced by 26.5 percent for the residents of those 39,000 housing units, Fresno County would have eliminated about 184 million vehicle miles annually—and the emission of about 75 million kilograms of carbon dioxide.[27]

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Concentrating growth in central neighborhoods could also have reduced overall local government expenditures. Costs to provide public services, and particularly policing, roadways, education, and parks and recreation, are substantially lower in communities with higher densities (Carruthers and Ulfarsson 2008). Fresno would not have had to invest in decades of roadway and sewer expansion out to exurban land. Instead, it could have invested those tax dollars into fostering more vibrant central neighborhoods through more public service provision, better support for local businesses, and environmentally friendly transit options. While the last two decades have seen increasing investment in downtown and adjacent neighborhoods (Yung et al. 2022), more needs to be done to reverse the effects of more than a century of sprawling growth.

Moving Beyond Sprawl

Despite Fresno's history of unabated sprawl, local and regional stakeholders have made attempts in recent years to encourage denser infill development. Notably, in 2015, the city adopted a new zoning ordinance that allowed for mixed-use, transit-oriented development along major commercial corridors and added significant allowances for residential density in the downtown core.[28] A recent analysis of zoning codes across the county found that 25.4 percent of residential land in the incorporated parts of

Fresno County was available for multifamily housing construction, compared to only 14.9 percent in the San Francisco Bay Area, 19.0 percent in Sacramento, and 23.1 percent in the Los Angeles region.[29] Voters in Fresno County have also signaled growing opposition to sprawling suburban growth—in 2022, they rejected the city's proposal to renew a local sales tax (known as Measure C) that would fund freeways and new roads serving suburban developments at the expense of public transit and existing neighborhoods.[30]

However, in spite of these successes, Fresno—and the broader Central San Joaquin Valley region—continues to experience headwinds against efforts to combat sprawl. In 2023, the city reintroduced a plan to create a Southeast Development Area (known as SEDA), which had been first introduced in 2004 and subsequently put aside after the Great Recession of 2008. The SEDA plan called for building a community of 45,000 homes in southeast Fresno that would displace over 9,000 rural acres, mainly farmland. Observers noted that it would be "one of the biggest suburban sprawl projects in Fresno's history,"[31] and the city's own environmental impact analysis showed that the project would increase overall greenhouse gas emissions by 25 percent.[32] The plan was put on hold in January 2024 after meeting significant local opposition, but it is symbolic of the continued demand from developers, often supported by public officials, to build on the city's edges rather than focusing on infill growth.

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This report illustrates some of the consequences of the Central San Joaquin Valley region's sprawling growth from the 1940s to the present, including higher greenhouse gas emissions, reduced access to transit, and the neglect of central neighborhoods, whose residents are disproportionately people of color. To confront these patterns and move beyond sprawl toward more equitable and sustainable development, stakeholders in Fresno—including residents, policymakers and elected officials, civic leaders, and business leaders—must come to a shared understanding about the specific local drivers of sprawling development and its consequences, especially for low-income residents, residents of color, and other historically marginalized groups. Fresno continues to have one of the highest rates of concentrated poverty among California cities, and sprawling development has contributed in no small part to the current inequitable distribution of wealth and resources. As Fresno stands at the proverbial crossroads, it must explore these and other important questions: Who benefits from sprawl? Who is harmed?

As we described in the introduction, there is a large body of best practices to promote denser development, including through infill construction and smart growth. Policymakers in Fresno and throughout the region must come together to build the requisite political and community consensus around a portfolio of smart growth policies and plans that can help Fresno—and the broader region—

recalibrate its development processes and patterns and chart a course to a more equitable, climate resilient, prosperous, and healthy future.

Thanks to the state's investments in downtown Fresno and across the region via the California high-speed rail project, the Central San Joaquin Valley has a pivotal opportunity to transform its development pattern from sprawling growth to denser infill development. While the region has been sprawling consistently for decades, evidence from other regions suggests that it is possible—and advisable—to change that approach. Fresno and its neighboring cities can grow by investing in existing core neighborhoods, while maintaining a focus on equity and environmental health. In that way, the region may be able to preserve its remaining agricultural and natural areas, redirect public expenditures toward essential services like transit, and improve the vitality of existing neighborhoods and the well-being of residents.

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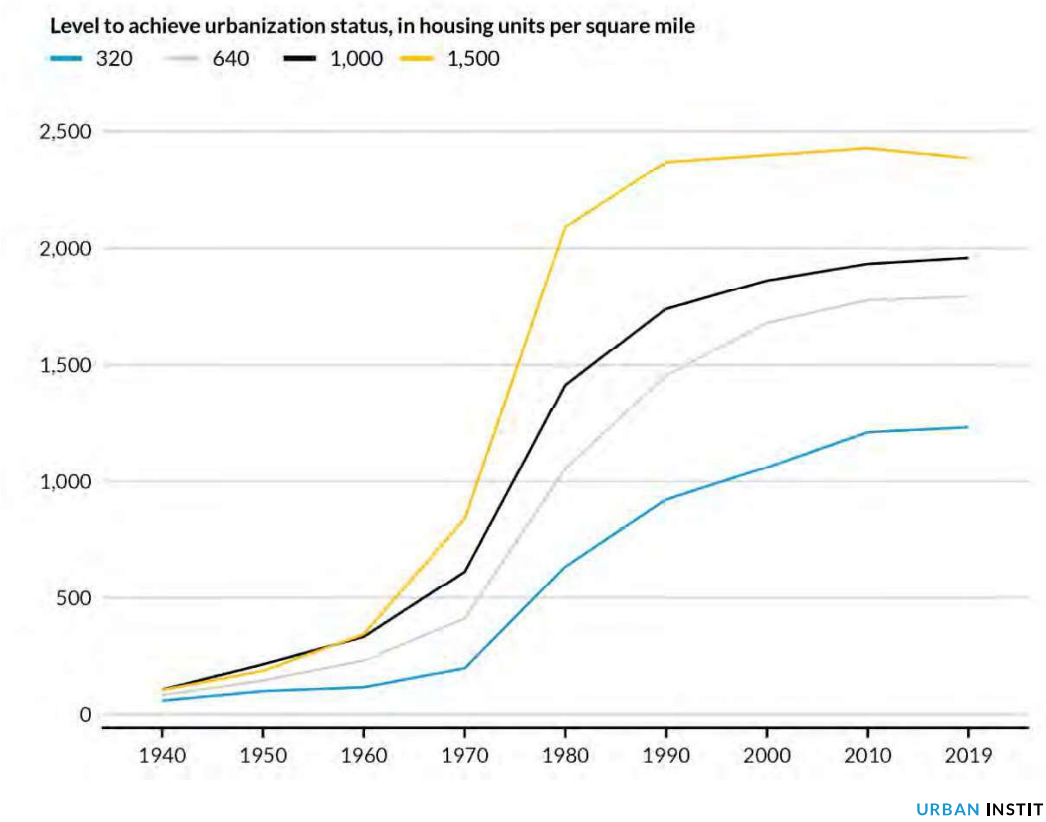
Appendix A. Alternative Density Measures

FIGURE A1

Testing Alternative Specifications for a Tract Becoming Newly Urbanized in the 1970s

Housing unit density by specification for achieving new development status, among tracts that achieved that level in the 1970s, Fresno, Kings, Madera, and Tulare Counties, California



Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.
Notes: Tracts are categorized by the four different density cutoffs. The blue line marking 320, represents tracts that increased from below 320 housing units per square mile at the beginning of the decade to above 320 units at the end of the decade. We then apply this method using the cutoffs of 640, 1,000, and 1,500 housing units per square mile.

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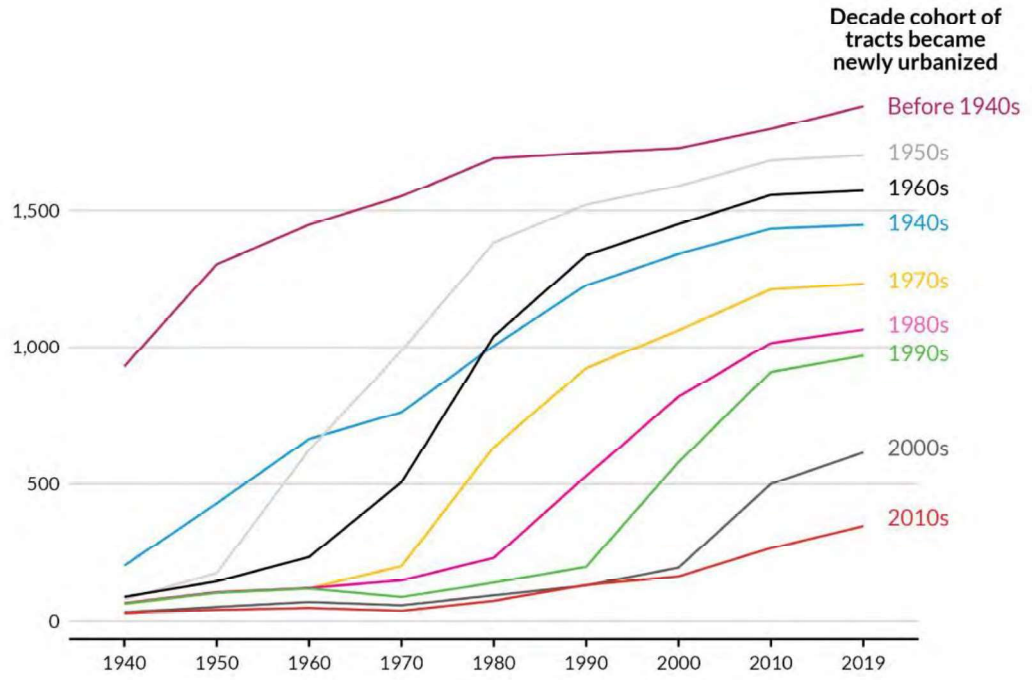
FIGURE A2

Alternative Specification for New Urbanization at 320 Housing Units per Square Mile

Housing unit density by decade tracts became newly urbanized, Fresno, Kings, Madera, and Tulare Counties, California



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Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.
Notes: A tract counts as being newly urbanized in a decade if its housing unit density increased from below 320 housing units per square mile at the beginning of the decade to above 320 units at the end of the decade.

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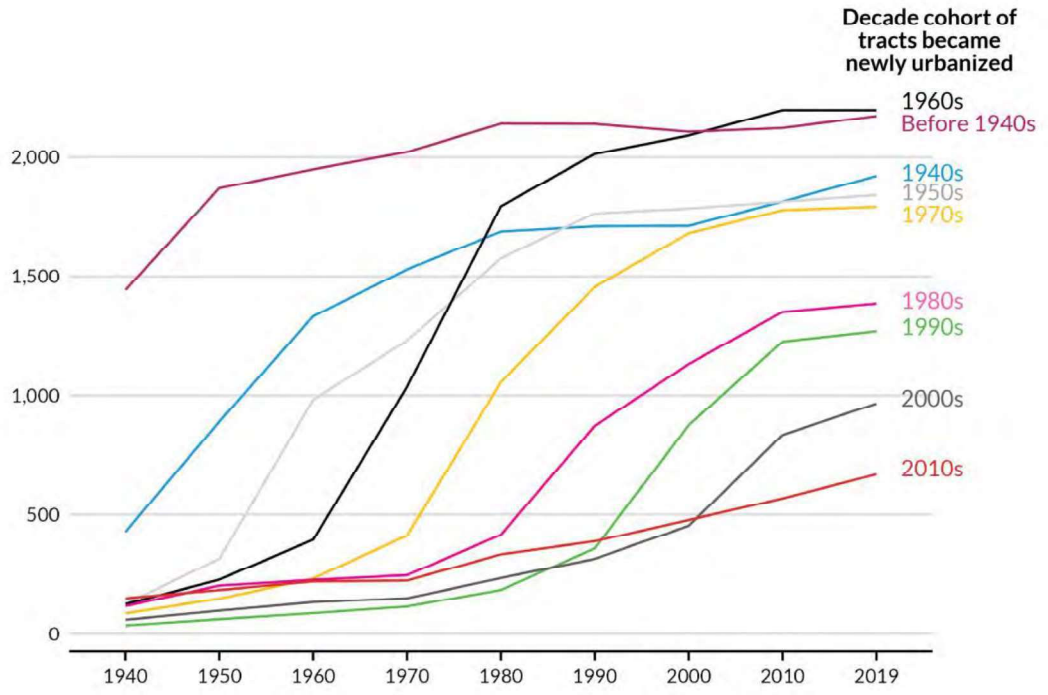
FIGURE A3

Alternative Specification for New Urbanization at 640 Housing Units per Square Mile

Housing unit density by decade tracts became newly urbanized, Fresno, Kings, Madera, and Tulare Counties, California



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Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.

Notes: A tract counts as being newly urbanized in a decade if its housing unit density increased from below 640 housing units per square mile at the beginning of the decade to above 640 units at the end of the decade.

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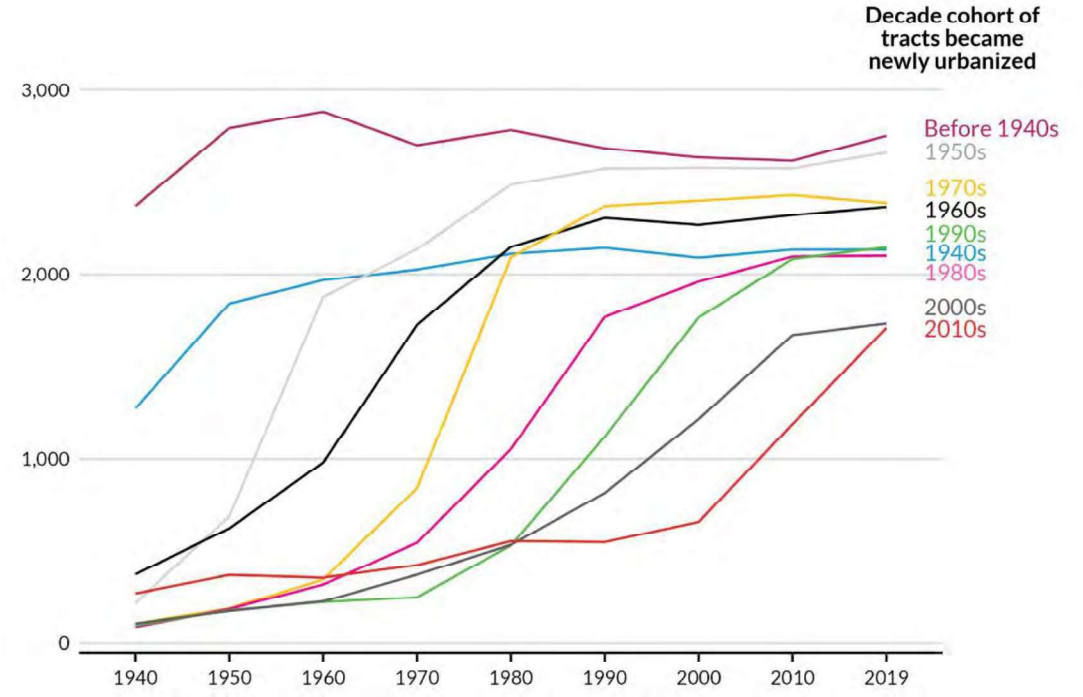
FIGURE A4

Alternative Specification for New Urbanization at 1,500 Housing Units per Square Mile

Housing unit density by decade tracts became newly urbanized, Fresno, Kings, Madera, and Tulare Counties, California



Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.

Notes: A tract counts as being newly urbanized in a decade if its housing unit density increased from below 1,500 housing units per square mile at the beginning of the decade to above 1,500 units at the end of the decade.

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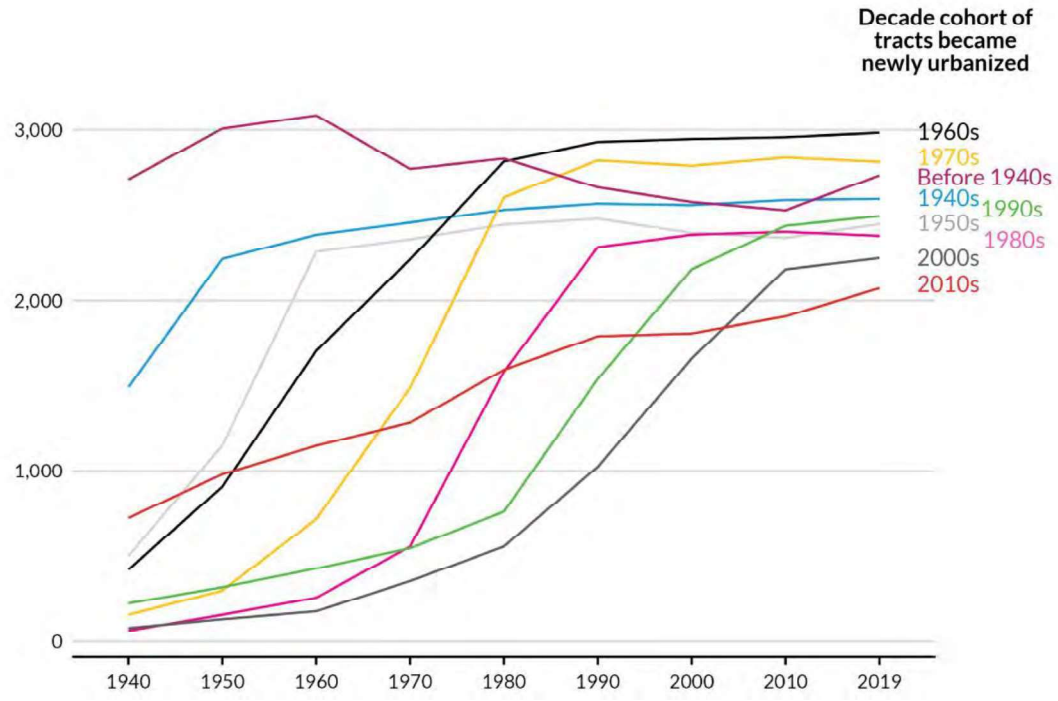
FIGURE A5

Alternative Specification for New Urbanization at 2,000 Housing Units per Square Mile

Housing unit density by decade tracts became newly urbanized, Fresno, Kings, Madera, and Tulare Counties, California



URBAN INSTITUTE

Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.
Notes: A tract counts as being newly urbanized in a decade if its housing unit density increased from below 2,000 housing units per square mile at the beginning of the decade to above 2,000 units at the end of the decade.

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Appendix B. Regional Development Trends

TABLE B1

Housing Units, by Decade When Tract Became Newly Urbanized

Fresno, Kings, Madera, and Tulare Counties, California

Decade tract became newly urbanized	Four Counties		Fresno County	
	Housing units in 1940	Housing units in 2019	Housing units in 1940	Housing units in 2019
Before 1940	24,005	32,480	19,346	24,715
1940s	5,433	16,923	2,200	9,101
1950s	2,214	31,387	2,002	30,019
1960s	2,351	35,416	843	26,765
1970s	3,672	66,170	1,252	40,752
1980s	2,367	38,819	1,183	23,689
1990s	2,634	44,939	305	26,532
2000s	1,553	31,162	497	16,218
2010s	1,088	11,338	625	10,454
Sparsely developed	59,234	268,360	26,251	122,897
Total	**104,553**	**576,994**	**54,505**	**331,142**

Source: Author analysis, based on the Historical Housing Unit and Urbanization Database 2010.

Notes: A tract counts as being newly urbanized in a decade if its housing unit density increased from below 1,000 housing units per square mile at the beginning of the decade to above 1,000 at the beginning of the next decade. This table can be read as follows: The tracts that became newly urbanized in the 1970s contained 66,170 housing units across the region in 2019. These same tracts had 3,672 housing units in 1940.

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Fresno Urban Decay Analysis

Analyzing the impacts of sprawl on the urban core

Analysis by ECONorthwest for The Greenfield Coalition
August 16, 2023

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History of Fresno

Agricultural land around Fresno

In 1872, the Central Pacific Railroad Company founded Fresno to locate a new rail station and the city built up around the railroad. In 1874, Fresno became the county seat and in 1885 it was incorporated. J Street, located two blocks from the railroad, became a busy street for new homes, churches, and commercial development. Fulton Berry, a real estate developer from San Francisco, opened the first hotel in the city in 1880 named The Grand Central. Fulton Berry was well-known in Fresno and in 1910 the city changed the name of J Street to Fulton

Street in honor of the developer. During this time, the region created the Central California Colony to subdivide land into 20-40 acre parcels with irrigation from a system of canals that guaranteed water to these parcels.

The promise of water made the land very attractive to farmers from around the country, and by the early 1900s this region was attracting farmers from Scandinavia, Germany, Russia, Japan, and Armenia as well. During the early 1900s, the city built out its streetcar network by converting the horse-drive line to electricity. At its peak, the system operated over 42 miles of tracks, which helped to spur development out from the Downtown core.

Downtown Fresno

Today, Fresno County remains one of the top agricultural producing regions in the country, with production values of over $8 billion in 2022, a 1.5% increase over the 2021 value. The top five crops by total value are almonds, grapes, pistachios, poultry, and milk.

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What is Urban Decay?

Many cities and researchers have studied the indicators and effects of urban decay, but there is not a common definition of urban decay. For this research, we analyzed other urban decay studies to define urban decay in the context of the City of Fresno.

Over the past two decades, many cities in California have looked at urban decay studies as part of the California Environmental Quality Act (CEQA) to understand the impacts of new retail development (typically large-format or big-box stores) to examine

adverse effects on existing retail and the contribution to urban decay and consequent environmental impacts. CEQA does not define urban decay. However a prominent CEQA case involving an urban decay study, Bakersfield Citizens for Local Control v. City of Bakersfield, defined physical impacts of urban decay as long term vacancies, graffiti, weeds, and unsightly conditions.

In 2021, data scientists at Stanford University created a model to detect signs of urban decay in cities. They defined urban decay by eight visual indicators: potholes, graffiti, garbage, tents, barred or broken windows, discolored or dilapidated facades, weeds, and utility markers. They used the model to analyze photos for these eight indicators in three cities, San Francisco, Mexico City, and South Bend, Indiana. They found that these indicators closely matched the historical trends of decay for neighborhoods in these cities.

For this study, we utilized these physical indicators of urban decay while also considering the City of Fresno's definition of blight. From the Fresno Municipal Code (FMC), blight is defined as:

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A vacant residential, commercial, or industrial building and all yards surrounding the building that reduces the aesthetic appearance of its neighborhood, area or district, is offensive to the senses, or is detrimental to nearby property or property values. A blighted building includes a vacant building and the yards surrounding the building that are not being actively maintained, or actively monitored, or actively secured. To actively maintain, monitor, and secure a vacant building, the owner or his or her agent must comply with all sections of this article and do all of the following: maintain Yards, life and healthy, maintain exterior

> *of building including paint and finishes, Remove trash within 72 hours, maintain building with all state and city codes, regulations and permits take all reasonable steps to prevent illegal or criminal activity on premises, secure the property: replacing broken windows or doors. Boarding up is a "disfavored technique"; remove all Graffiti within 48 hours. (FMC 10-603.C)*

While urban decay and blight are not interchangeable, the City's definition of blight also highlights the physical and economic burdens placed on the community from dilapidated properties.

How is Urban Decay Measured?

Across these previous urban decay studies, the indicators of decay are physical elements that signal disinvestment in an area. However, deteriorating economic conditions from disinvestment can both cause the physical decay and be an externality that creates a cycle that continues to degrade the quality of life for those residents still present in the community. For this study, we move beyond physical characteristics to also evaluate the indicators, symptoms, and potential causes of urban decay with respect to economic, social, and quality of life factors.

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Physical Decay

Marked by disinvestment and abandoned properties, physical decay is visible in vacant storefronts and residential units, vacant parcels, insufficient infrastructure, and blighted properties that may have graffiti, trash, or boarded up windows. Abandoned or depreciated properties are indicators that people or businesses have moved out, which can encourage nuisance uses including fires, crimes, and squatting that can cause harm to residents in these neighborhoods.

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CONT

Economic Decay

Marked by outmigration and economic performance, the economic decay indicators include a loss of people to other parts of the region, a loss of people to other regions, and a lack of new private investment in the community. This decay depresses market conditions and leads to a decline in private investment and reinvestment. When people leave the city, there can be an impact on the city's general fund and the city's ability to provide services at the same level as before.

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CONT

Quality of Life

Marked by the socioeconomic conditions of those residents who remain in the decaying communities, or can only afford to live in places where disinvestment is occurring, the symptoms of urban decay are observed through increases in poverty and declines in household income levels, a lack of housing opportunities, degradation of environmental conditions, and a decline in the quality of schools.

Physical Decay

Physical decay is marked by a number of different metrics related to visible elements of the built environment. Scroll through this section to see how trends in vacant lots, infrastructure, and blight impact urban decay in Fresno.

Fresno County Dept. PW, Bureau of Land Management, Esri, HERE, Garmin... 3 mi Powered by Esri

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Vacant Lots

Of the 63,000 acres within the City of Fresno, approximately 8,700 acres, or 14 percent, are vacant, including those designated as agricultural open space. While the majority of the vacant parcels are smaller than a quarter acre, among both vacant and non-vacant parcels, vacant parcels contain a greater share of parcels larger than a quarter acre. Eight percent of vacant parcels are between .5 and 1 acres, in comparison to only 3 percent of non-vacant parcels. This seems to indicate an available share of developable land.

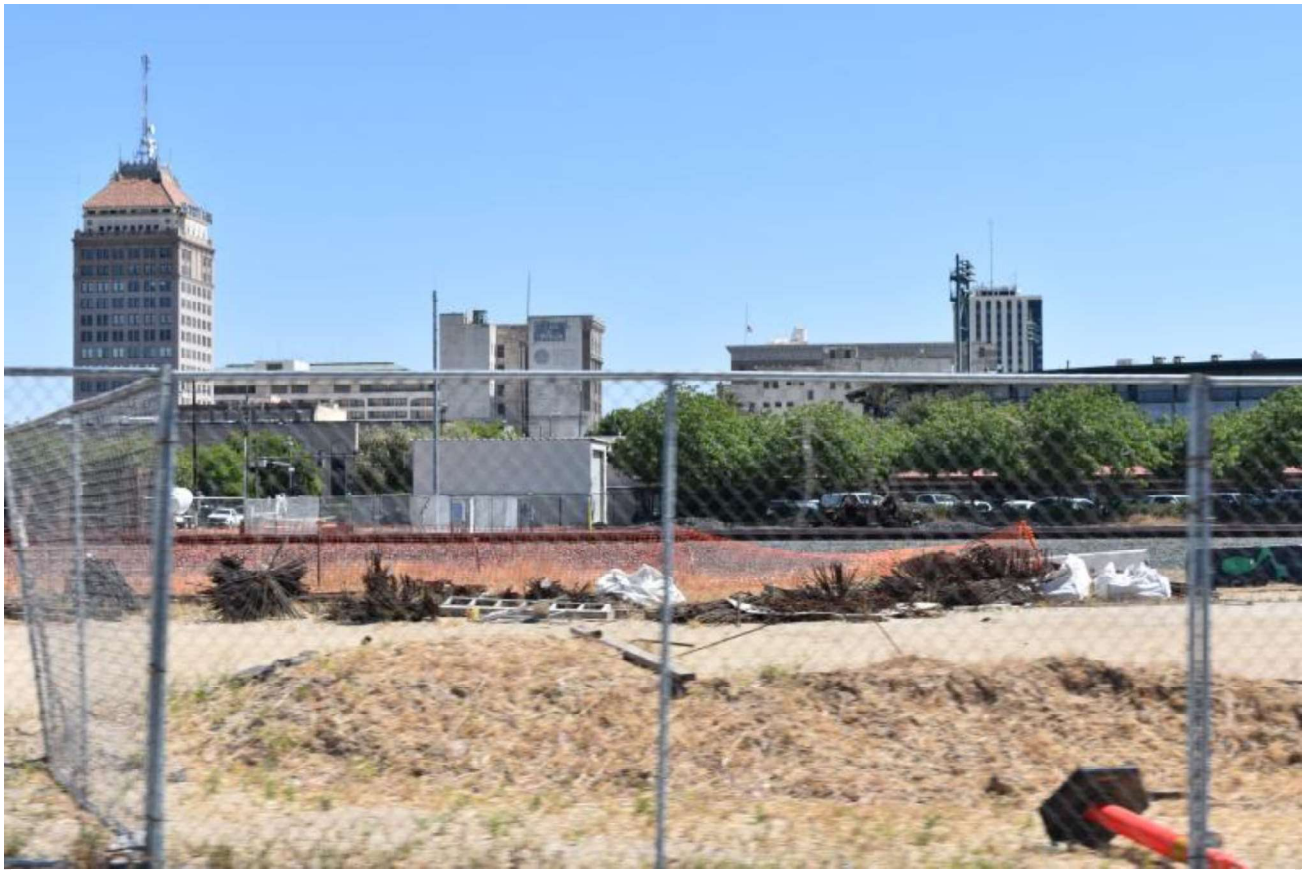
Among the 4,800 vacant parcels within the City of Fresno, more than half (2,500) are less than one acre large. There are approximately 280 parcels larger than five acres.

There are smaller infill lots along corridors in the downtown and central city that are adjacent to existing uses and could

provide synergistic benefits to residential development. On the periphery of the city, there are larger parcels available, but they are further from existing city amenities and opportunities.

Source: City of Fresno

In 2019, the City of Fresno used GIS to calculate that there are over 8,200 vacant acres within the existing city boundaries and identified the current zoning of these parcels to determine that this undeveloped land has the capacity to hold over 134,000 housing units.



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Infrastructure

There is considerable need for infrastructure repairs and upgrades in the City of Fresno. The City and State have discussed and

directed funding for the inadequate infrastructure, and understand the need especially in historically disinvested neighborhoods. The atmospheric river storms this past winter highlighted the worsening conditions of Fresno's city streets; the Mayor has addressed this issue in his budget proposal this year by allocating $3 million more dollars to street maintenance this fiscal year.

> *In January 2023, Fresno's Public Works Director estimated that the backlog of repair for Fresno city streets is $500 million.*

The State has also recognized the importance of upgrading the infrastructure in Downtown in order to support new residential development and the future of the city. Governor Newsom directed $250 million of the 2023-2024 state budget to fund infrastructure improvements in Downtown Fresno. This funding would support new wastewater and sewer systems, a stormwater drain basin, sidewalks, linear green space and pocket parks, an intermodal transit center, and two new parking structures to facilitate housing development in Downtown Fresno. These investments are indicative of the barriers to private development and investments in these districts.

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Infrastructure Disparities

Fresno has witnessed a pattern of disparity in how infrastructure spending has been distributed in the city. In 2021, three Fresno City Council members proposed a five-year infrastructure plan called Rebuild Fresno to drive city funds and federal pandemic dollars into South and Central Fresno infrastructure projects, where the need is the greatest because some of these neighborhoods are over 100 years old. Many of the streets in these neighborhoods are lacking sidewalks and investments in public safety.

> *The need for infrastructure repairs in legacy communities also inhibits redevelopment and new residential development in these areas.*

Developers have expressed many concerns about the high costs of providing adequate water and sewer lines when building in certain neighborhoods. The infrastructure in the city can be 80-100 years old depending on the neighborhood, so private investors face uncertainty and greater risk, since they cannot know the condition of the infrastructure until construction begins. If the developer has already created a pro forma and secured debt for the project, and then the condition of the infrastructure is not as expected, it may not be feasible for developers to find additional capital–which may require mezzanine financing at higher interest rates.

This dynamic can make development projects more expensive than originally planned, such that the developer may not hit their needed returns. Thus, developers often prefer to build in locations outside of the city center, including land requiring annexation where they can accurately assess infrastructure costs, and in many cases, receive public investment to support off-site and system-wide infrastructure.

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Blight

As an indicator of growing blight and disinvestment in neighborhoods, the Fresno City Council approved an Anti-Blight Ordinance in 2015 to hold property owners responsible to clean up visible blight on their properties and to register vacant properties with the city. Blight has been a significant issue in many of the city's older neighborhoods and vacant properties are hazardous and costly to the community.

> *In 2014, the city spent almost $500,000 on fires at vacant properties.[1] In 2019, vacant property fires have cost the city $4.1 million in damages, which is passed on to the property owner but can take up to a year to be recouped by the city.[2]*

Source: ABC30

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CONT

Anti-Blight Ordinance

The City's Code Enforcement Department oversees violations for vacant and blighted buildings and requires owners of these properties to maintain the yard that is visible from the public right of way, maintain the exterior of the building including the paint, roof, and structural elements, and remove all trash and debris within 72 hours of notification.

> *As part of the ordinance, the City also began a vacant building registry, which requires the registration of all buildings that are vacant for longer than 30 days with the City of Fresno.*

The registry includes the name of the owner and the local contact for the property. Vacant properties that are not registered are subject to a $250 citation per month. Despite the city's ordinance and vacant building registry, blight is very visible in the city and still persists in many neighborhoods, which causes safety concerns for many residents.

On July 20, 2023, the City awarded a contract to eProperty Innovations to help the City of Fresno to plan and develop the creation of a land bank, which will promote the City's objective to acquire properties to advance community and economic development in targeted areas.

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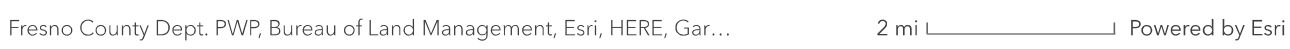

Code Violations

The City Attorney's Code Enforcement Division maintains a list of buildings which have received code violations from 2015 to 2022.

There are four main violation categories, Commercial, Housing, Public Nuisance, and Zoning. The violation types within these categories range from trash in front of the building to dangerous buildings in need of repair. In the first year of data, the division investigated 97 different unique addresses for possible violations and 124 possible violations showing that there are certain properties that remain problematic and face numerous violations each year. This number has increased every year, most dramatically from 2017 to 2019, when the number of buildings investigated rose from 342 to 15,920 and the number of possible violations increased from 483 to 16,309 over just the 2 years. The total number of addresses investigated from 2015 to 2022 is 81,053 and the total number of possible violations is 84,746

The map shows the reported code violations in the City between 2015 and 2022. There are certain neighborhoods, and specific parcels within those neighborhoods, that receive many violations over this time, including Blackstone Avenue, Belmont Avenue, and Kings Canyon Road. The code violations data matches the visual experience of blight and substandard buildings lining these corridors. Concentrations of blighted properties with repeated code violations have adverse impacts on the desirability and market potential of adjacent properties and perpetuate disinvestment.

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Source: City of Fresno

Economic Decay

Economic trends can also indicate urban decay through change in outmigration and economic performance. Scroll through this section to see indicators for economic decay in Fresno, including shifts in population density, people leaving the County, and challenges for real estate development.

Fresno County Dept. PWP, Bureau of Land Management, Esri, HERE, Gar… 5 mi Powered by Esri

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Population Density

> *Since the 1970s, the City of Fresno has become increasingly dense as the City's population has grown. Between 1970 and 2020, City of Fresno's population density, measured in persons per square mile, increased by almost 650%.*

This population density growth occurred mostly in the 1970s, 1980s, and 1990s. Since 2000, the population density growth rate has declined: between 2000 and 2010, population density increased by 30% and between 2010 and 2020, population density increased by only 15%. The City has not kept pace with the population density growth of Fresno County, lagging by 16 percentage points in density growth between 2000 and 2010 and

by 13 percentage points between 2010 and 2020. During this time period, people have left the central city and moved north, both northeast and northwest, and to the east of the central city. The central core of Fresno and Southwest Fresno have seen the least growth, and in some cases negative change in population density.

The map on the right illustrates the percentage change in persons per square mile between 1970-2020 across Fresno. Within the previously established population centers in central and Southwest Fresno, population density has decreased over time (indicated in orange) showing that people are leaving these established areas and moving to the newer communities in the north where the population density has increased significantly (dark green). The city has seen various changes to population density over the past 50 years, indicating a shift in residential patterns. Outmigration in established centers perpetuates economic decay through a decline in support for commercial services.

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Source: Community Survey and Decennial US Census

Migration

The IRS Statistics of Income (SOI) Division's Tax Stats Migration Data tracks tax return movement by county and is based on year-to-year address changes reported on individual income tax returns filed with the IRS. The data is available for inflows, which represents the number of new residents who moved to a county and where they migrated from, and outflows, which represents the number of residents leaving a county and where they went.

The map on the right shows Fresno's inflow and outflow of individuals based on IRS data for 2019-2021. Click through the points on the map to see these values of individuals moving to for from different areas of California.

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Some key observations from the Fresno County migration data show:

- Fresno County sees the largest share of outmigration to Madera County, which demonstrates that people and development are "jumping" over the river.
- The largest share of in-migration comes from within the San Joaquin Valley, but Fresno loses to other San Joaquin counties on net migration.
- More people are moving to Fresno from Southern California than the Bay Area, but in net migration more people are coming from the Bay Area.
- Households moving into Fresno County are larger on average and have lower incomes than those households leaving Fresno (with the exception of migration from the Bay Area).
- Fresno County loses more residents to other states than it sees in-migration from other states; residents leaving Fresno for other states have a higher household income than the people

migrating into Fresno from other states.

The data shows that the inflow of residents to Fresno County are in households with lower incomes than the City and County averages, suggesting that in-migrants may be seeking a more affordable cost of living that is available in the county; these households thus increase the demand for housing that is at and below the median price in the Fresno market.

Source: Internal Revenue Service

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Lack of Private Development Interest

Despite the opportunities in some of Fresno's key areas and corridors, including the rezoning in 2015 that allows mixed-use residential by right, high-travel corridors with bus rapid transit,

and large vacant parcels, there has been a lack of private investment in many areas of the city. When there are not comparable existing market-rate mixed-use development projects, developers expressed that it is hard to understand the rent/ unit mix and the demand for these projects, and it can be a challenge to access financing to build certain product types because developers cannot show financial institutions, who are deliberate about placing capital, that other similar buildings have been successful in the community.

The lack of private development is a symptom of decay because the private market relies on indicators in the real estate market to signal a healthy market that will provide the needed return on investment to the developer and the bank. If these return rates cannot be met in the local market, it will be hard for private development to invest in these decayed neighborhoods.

Source: CoStar, Developer Interviews

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Quality of Life

Quality of life is also a significant component of understanding urban decay. Scroll through this section to see indicators in Fresno related to socioeconomic conditions, environmental quality, and education.

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Socioeconomic Conditions

Poverty

From the 1970s to 1980s, the poverty rate decreased by 31% in the City of Fresno, and countywide poverty decreased by 32%. However, this trend reversed in subsequent decades:

> *During the 1980s through the 2000s, the City of Fresno saw large **increases** in the poverty rate, from 15% in 1980 to 22% in 2000, or a 44% increase. The poverty rate only increased by 36% countywide during the same period, indicating that those with higher incomes migrated outside of the city limits.*

On average, roughly one-quarter of the city population was living in poverty between 2000 and 2010. However, post Great Recession, poverty in the City of Fresno decreased by 11%. By 2021, the poverty rate citywide was 21% — only one percentage point higher than the County's poverty rate.

The map on the right shows the share of households below the poverty line between 1970-2020 across Fresno. Poverty in the city is concentrated in the center and southern portion of the city, while the north portion of the city experiences the lowest poverty rates. The disparity in poverty rates across Fresno has grown over time. Increasing rates of poverty in historic neighborhoods is a symptom of economic decay and the adverse impacts of disinvestment.

Source: Community Survey and Decennial US Census

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CONT

Household Income

> *In 2021, the median household income in the City of Fresno was $63,000 while the countywide average was $65,000, indicating that higher income households are migrating outside of the city limits.*

The City of Fresno has seen real income growth over the last 10 years. Real median household income increased by 7% between 2010 and 2021. During the 1990s and 2000s, real income decreased by 5% before rebounding in the 2010s. This trend mirrors the rest of the state due to the recessions in the early 1990s and 2000s. Between 1980 and 1990, Fresno County and City of Fresno saw the largest increase in real median household income of approximately 22%. Fresno County has seen modest growth in median household income since the 1990s while the City of Fresno experienced a decrease in median household income between 1990 and 2010.

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The map on the right shows the change in median household income between 1980-2020. The further from the central city a household is, the higher the median household income; households with higher incomes have more options and have moved north or out of the city, leaving behind lower income households and decaying conditions. The exodus of higher incomes leaving the city exacerbates urban decay, as these wealthier households move their spending power and tax revenues out of the neighborhoods where they are needed the most.

Source: Community Survey and Decennial US Census

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Housing Conditions

Cost-Burdened Renters

Those households spending more than 30% of their gross income on rent are defined by the Department of Housing and Urban Development (HUD) as cost-burdened. The percentage of cost-burdened renter households within the City of Fresno has hovered around 50% since the 1970s.

> *The cost burden rate for the City peaked in 2010 following the Great Recession at 53%, meaning that more than one out of every 2 renters was cost-burdened.*

Though still above 50%, the cost-burden rate decreased to 51% in 2021. Fresno County follows the same trend as the city with the cost-burden rate increasing since the 1970s with the peak in 2010. However, the percentage of renters in Fresno County who are cost-burdened is 2 to 3 percentage points lower than the city across the period.

The map on the right shows the share of cost burdened renters in Fresno between 1970-2020. Cost-burdened renters are more prevalent in Central, Southeast, and Southwest Fresno, demonstrating these communities have more people struggling to get by and may have less disposable income for other goods and services besides rent, which can contribute to further decay in the neighborhood.

Source: Community Survey and Decennial US Census

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Overcrowding

HUD defines a dwelling unit as overcrowded if there is are than one person per room. Notably, the persons per room (PPR) definition of overcrowding differs from that of persons per bedroom. This method of measuring overcrowding includes those living situations in which household members sleep in multi-use spaces, such as a living room. We use the persons per room definition of overcrowding due to data availability.

> *Using the HUD definition of overcrowding, in 2021 11% of households are overcrowded in the City of Fresno.*

Historically, the rate of overcrowding has been higher in Fresno County than the City of Fresno. However, in 2021, 11% of households in the City of Fresno were overcrowded while 10% were overcrowded within the county. Prevalence of overcrowding in the city and county was highest during the 1990s*, reaching 17% in 2000. Since the 2000s, the rates of overcrowding have decreased to approximately 10% across the city and county.

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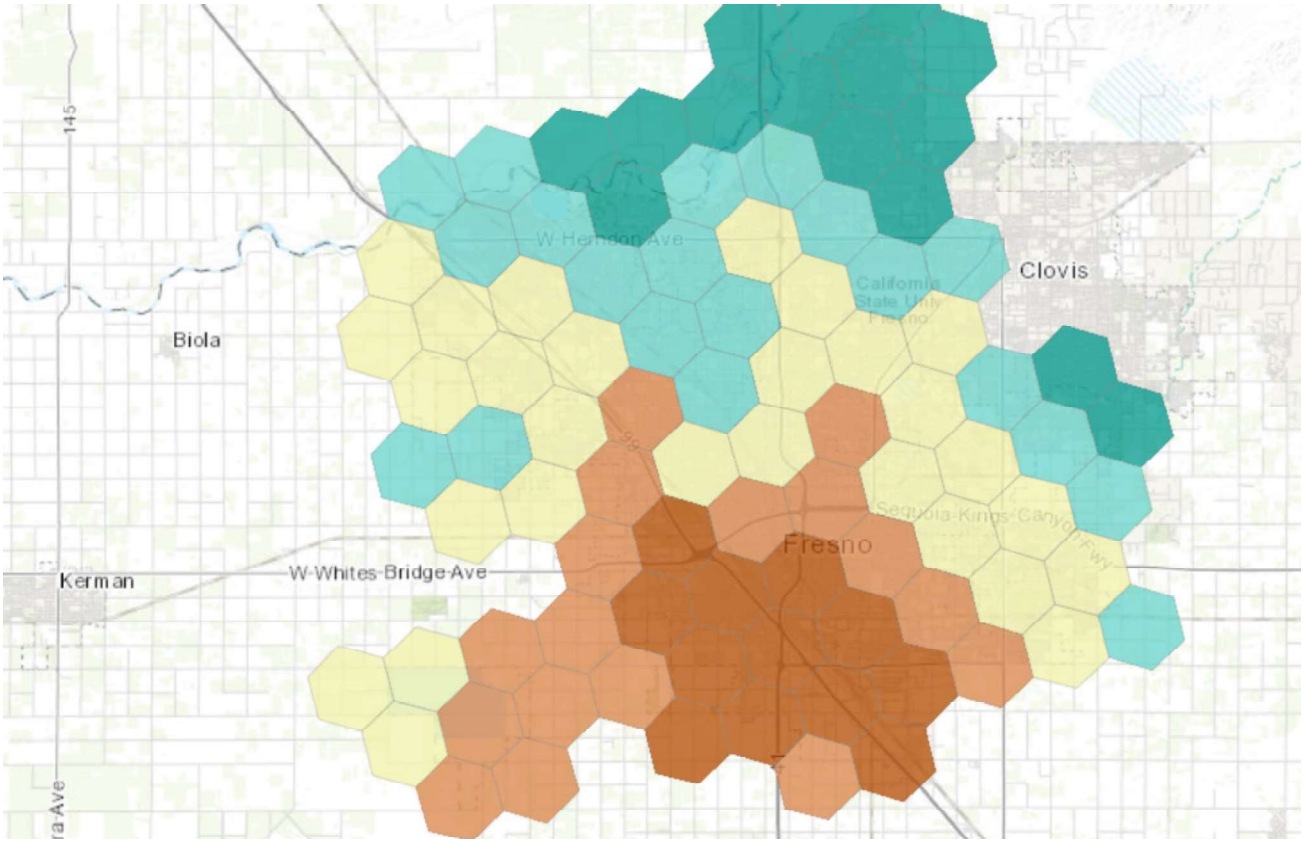
The map on the right shows the share of households with over 1 person per room between 1990-2020. Overcrowding is concentrated in Central, Southeast, and Southwest Fresno, while neighborhoods on the northern periphery of the city have the lowest rates of overcrowding. Some households may want to move out of a crowded housing unit, but Central and South Fresno have very low vacancy rates and very little new development because they are decaying neighborhoods, which can leave people trapped in overcrowded units.

*Note: overcrowding data was unavailable prior to 1990.

Source: Community Survey and Decennial US Census



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Environmental Quality

Cal Enviro Screen

The California Office of Environmental and Health Hazard Assessment has published the CALEnviro Score (CES) since 2013 to help communities recognize the pollutants in their area. The CES is a cumulative metric based on many different measurements of pollution such as PM5, lead, pesticides, hazard waste, drinking and groundwater threats, and more. Researchers account for pollutants at the Census Tract level and assign a rank (or percentile) across all geographies in California. A percentile of 100 indicates the worst CES score.

The City of Fresno is in the 73rd percentile in the state while Fresno County ranks in the 69th percentile and Clovis ranks in the 38th percentile.

> *The highest value of the CES, indicating the most significant environmental concerns, lies within the Fresno zip code 93706, which covers Southwest Fresno.*

Higher scores shown on the map in dark orange indicate a higher number of environmental pollutants in an area based on CalEnviro Screen scores. The highest scores are in central and south Fresno, along the railroad tracks, and the scores decrease the further one moves from the central city. These intense environmental hazards can cause decay by encouraging residential and non-industrial uses to locate elsewhere, and can be a symptom of decay by creating a toxic quality of life for existing residents.

Source: California Office of Environmental and Health Hazard Assessment, 2021

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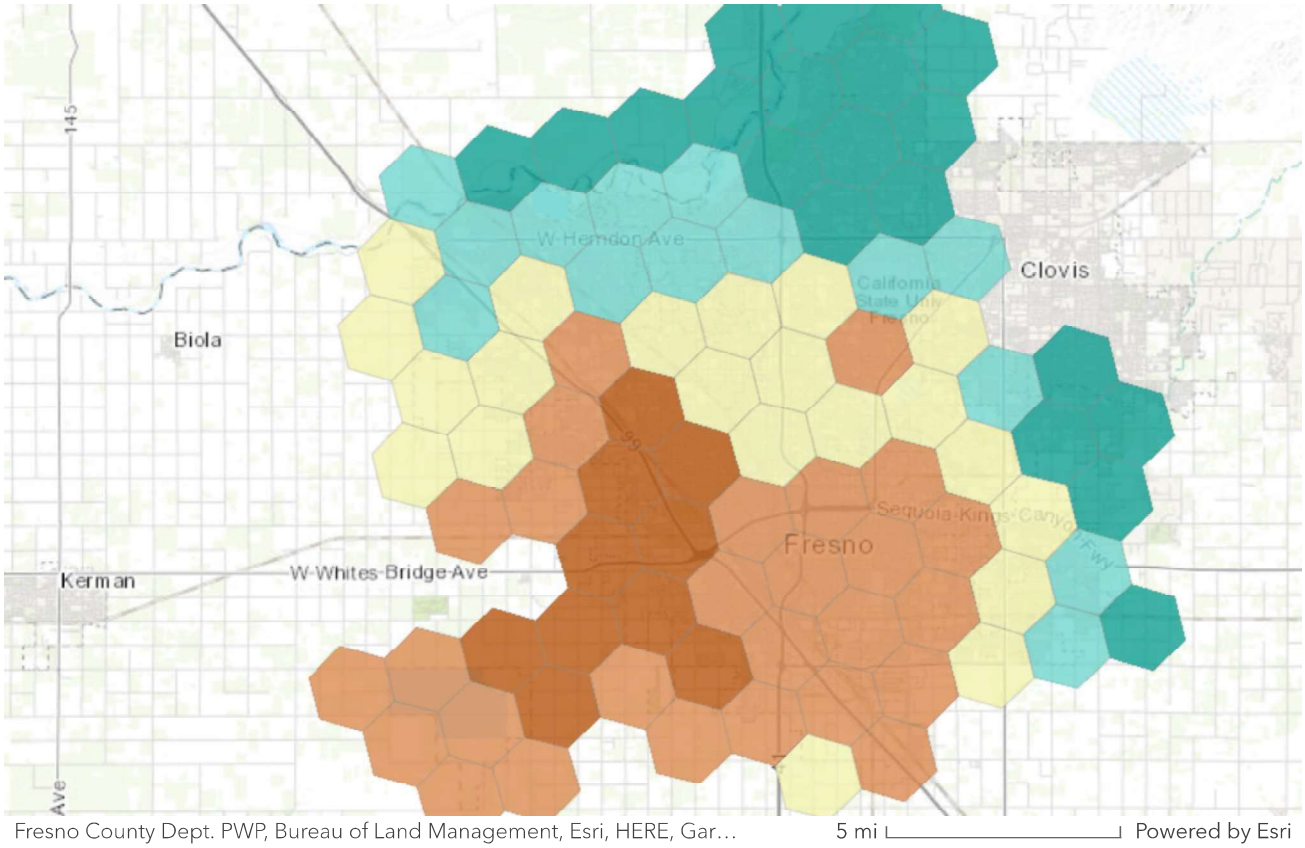

Education

TCAC Education Score

The California Tax Credit Allocation Committee assesses the quality of life as measured by an index of economic, environment, education dimensions across the state. The Education Score is assessed based on reading and math scores, high school graduation rate, and student poverty rate.

Lower scores represented on the map in dark orange indicate lower rates of educational attainment according to TCAC data. The education scores are lowest in West Fresno, and then in Central and Southeast Fresno, while the scores are higher the further north one moves. This represents a symptom of decay as families move out of these legacy neighborhoods to find higher performing schools, and the schools and students left behind face declining school conditions.

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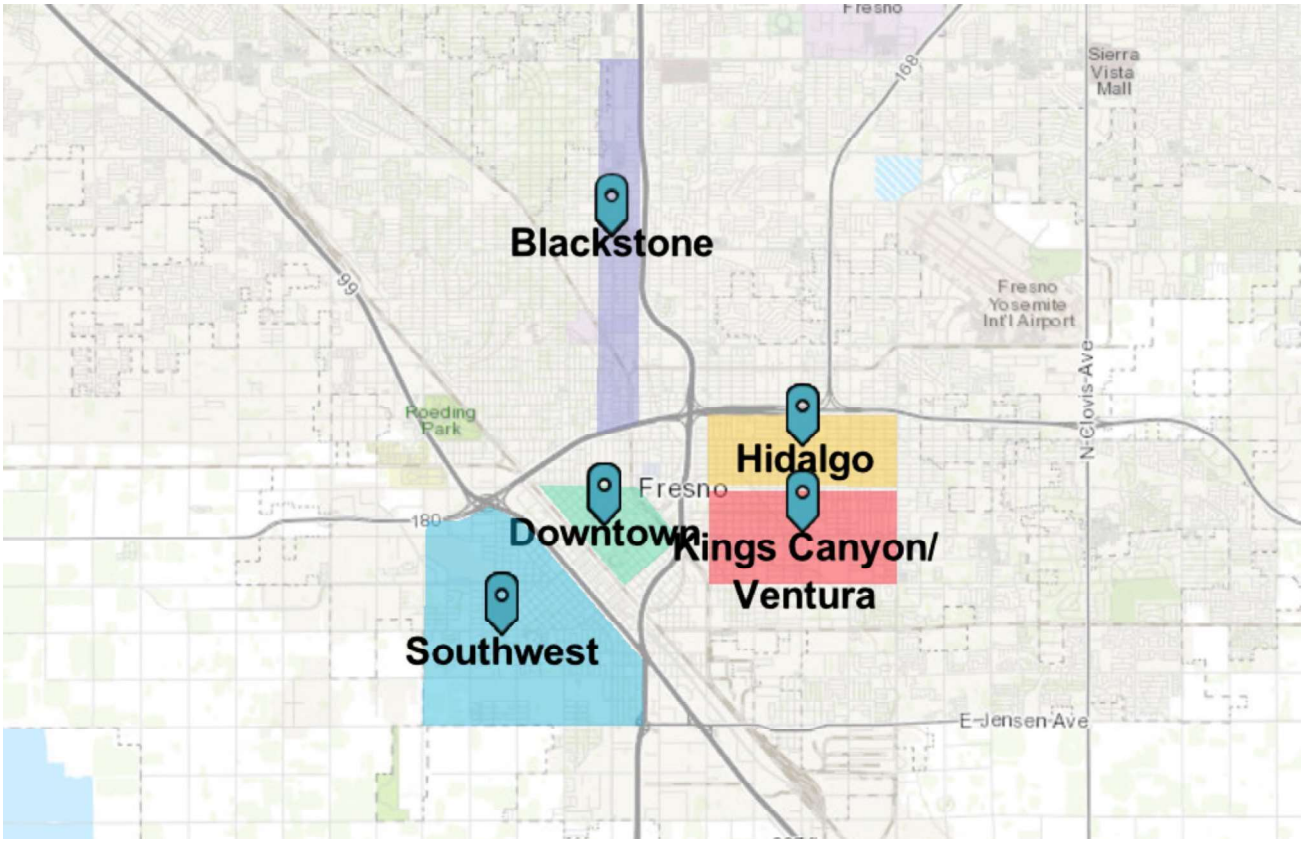
Source: California Tax Credit Allocation Committee

Focus Areas

This section focuses on specific areas of Fresno that represent some of the city's greatest challenges and opportunities for addressing urban decay. Click the list of the left to scroll through information about each of these communities.


Fresno
Sierra Vista Mall
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Blackstone
99
Fresno Yosemite Int'l Airport
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Roeding Park
Hidalgo
Fresno
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Downtown
Kings Canyon/ Ventura
Southwest
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Start Here: Fresno Corridors

This section of the map walks through five significant areas for understanding urban decay in Fresno, including Blackstone, Kings Canyon/Ventura, Hidalgo, Downtown, and Southwest...

Blackstone Corridor

Blackstone Avenue is a major arterial that runs north-south in the City of Fresno. Until the current Highway 41was constructed in the 1980s, Blackstone Avenue was the primary route...

Blackstone: High Commercial Vacancy

There are many vacancies along this corridor that contribute to blight, given that there are many large, big box vacancies, including the Sears. There are lifestyle centers that are vacan...

Blackstone: Vacant Parcels

There are about 30 vacant parcels in this corridor that total just over 44 acres, or 1.9 million square feet, of vacant land. The average size of the vacant parcels is just under 1.5 acres. Of...

Blackstone: Substandard Buildings

Between 2015-2022, Code Enforcement received 763 code violations along Blackstone Avenue: 33 commercial violations, 165 housing violations, 459 public nuisance violations, a...

Blackstone: Lack of Private Investment

Blackstone Corridor has the potential to be a thriving mixed-use and transit-oriented community, but it has seen limited development in recent years. As part of the Citywide...

Blackstone: High Injury Network

Blackstone Ave contains the most crashes out of any of the major streets in Fresno:

Kings Canyon/Ventura

The Ventura/Kings Canyon Corridor looks at the region between First and Chestnut, from Tulare to Butler. Along Ventura/Kings Canyon Road, the Q BRT runs every 10 minutes...

KC/Ventura: Housing Stock

There are about 1200 multi-family units across 70 buildings in this corridor. There is a high

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demand for rental units in this neighborhood and the vacancy rate is currently 3%. The...

KC/Ventura: Public Transit Amenities

This is a corridor where many individuals rely on public transit and along the FAX Q BRT line; despite the frequent and high transit use, there is inadequate amenities for public transit...

KC/Ventura: Vacant Parcels

There are about 10 acres of vacant land in this corridor, with the average vacant lot size of about 1/2 acre. The vacant parcels provide an opportunity for redevelopment, but the averag...

KC/Ventura: Lack of Private Investment

This area has not seen significant private investment, despite its strong potential to serve as a mixed-use corridor. Since 2000, there have been a couple multi-family buildings that have...

Hidalgo

The Hidalgo Community is a diverse neighborhood along Belmont Avenue, just east of Downtown Fresno. Hidalgo Elementary School reports that 79% of their students are Hispan...

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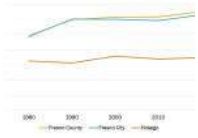
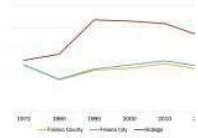


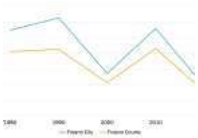
Hidalgo: Median Household Income

The median household income in the Hidalgo neighborhood has been roughly half of the city average since 1970. In 1970, median household income in Hidalgo was $32,600 and only...



Hidalgo: Poverty Rate

In the 1970s, the Hidalgo neighborhood experienced approximately the same poverty rate as the city and the county. However, during the 1980s, the city -wide poverty rate decreased...

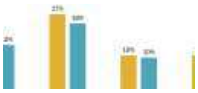


Hidalgo: Tenure

Hidalgo has a higher share of renters than the city average (41%). In 2021, 68% of households in Hidalgo were renters.

Hidalgo: Housing Stock Age

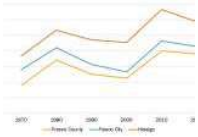
Hidalgo has an older and aging housing stock. In the City of Fresno, 58% of homes were built before 1979 while in Hidalgo, 77% of homes were built before 1979. There has not been...



Hidalgo: Overcrowding

In Hidalgo, 22% of households were experiencing overcrowding in 2021, while only 11% were

experiencing overcrowding across the city. The degree of overcrowding has decreased over...



Hidalgo: Cost-Burdened Renters

Households that spend more than 30 percent of their gross income on rent are defined by the Department of Housing and Urban Development (HUD) as cost-burdened, and Hidalgo has a...

Hidalgo: Pedestrian & Transit Amenities

This community relies heavily on public transit and walking to get to where they need to be. There are limited amenities for public transit users and pedestrians and many of the bus sto...

Hidalgo: Vacant Lots

There are 14 acres of vacant land in this neighborhood, with the average lot size of just under 1 acre. These vacant lots signal a lack of investment in the community.

Downtown

Downtown Fresno was the original epicenter of Fresno as it was located next to the rail station. Fulton Street was a bustling place from the 1920s through 1950s, but in the1960s...

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CONT

Downtown: Office Market

In Downtown, there is over 5 million square feet of office space in over 130 buildings. The average office building was constructed in 1962, and 8% of buildings have been renovated...

Downtown: Retail Vacancy

There is over 2 million square feet of retail space in Downtown. Along Fulton Street, there is a visibly high vacancy rate with the majority of spaces sitting empty or boarded up. The visibl...

Downtown: Lack of Private Investment

There are concerns over the condition of water and sewer lines in Downtown as some of them are 80 to 100 years old, which can hinder new residential development because the develope...

Downtown: Residential Market

Since 2000, multi-family development has rebounded in Downtown Fresno and 64% of the units in Downtown built since 2000 were located in the Mural District/Cultural Arts District....

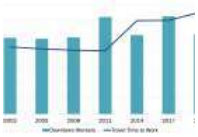
Downtown: Events & Entertainment

Downtown Fresno serves as the Downtown and event hub for Fresno County and it hosts

Downtown Fresno serves as the Downtown and event hub for Fresno County and it hosts many events that are well attended by people from throughout the region. In 2019, the...

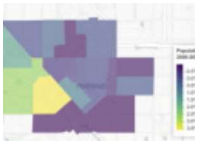
Downtown: Vacant Lots

Excluding land owned by the California High Speed Rail Authority, there is just over 11 acres of vacant land in the Downtown core. The average lot size is under 1/2 an acre. There is land...



Downtown: Commute Patterns

Less than 1% of employees both work and live in Downtown Fresno and the majority of workers commute to Downtown Fresno from the surrounding neighborhoods. The mean trav...



Downtown: Population Density

Downtown Fresno is historically denser than the city overall, and the population density has increased from 4,950 persons per square mile in 1970 to 6,880 persons per square mile in...

Downtown: Employment Density

Downtown Fresno nonetheless remains the epicenter of employment in Fresno, with nearly three times as many jobs per square mile in comparison to the City of Fresno as a whole.

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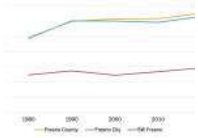
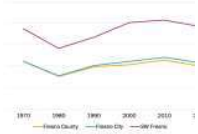
Southwest Fresno

Southwest Fresno comprises a large geographical area southwest of the 99 that has experienced historic disinvestment from racially discriminatory policies and redlining....



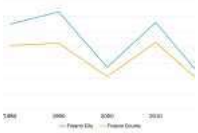
Southwest: Median Household Income

Residents of Southwest Fresno have only experienced modest gains in real income since the 1980s; between the 1980s and 1990s, the median household income in Southwest Fresno...



Southwest: Poverty Rate

The poverty rate in Southwest Fresno has hovered between 28% and 42% since the 1970s. Southwest Fresno residents were experiencing an increasing poverty rate since 1980; only...



Southwest: Tenure

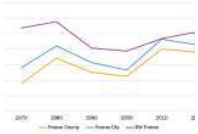
Southwest Fresno has a higher share of renters than the citywide average (41%). In 2021, 70% of households in SW Fresno were renters.

Southwest: Housing Stock

Southwest Fresno has an older and aging housing stock than the city-wide average. In the City of Fresno, 58% of homes were built before 1979 and 65% of homes in Southwest Fresno were...

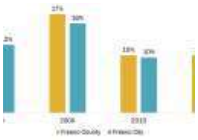
Southwest: Substandard Housing

There are over 1600 units of multi-family housing in this neighborhood, and about 90% of the units are rent restricted or subsidized units. The average asking rent per unit per month of t...



Southwest: Cost-Burdened Renters

Currently, over 55% of renters in Southwest Fresno are cost-burdened, which is higher than the average city and county cost-burdened rate. These households will have less disposable...



Southwest: Overcrowding

Overcrowding in SW Fresno has decreased over time, but still lies above the city average. In 2021, 1% of households were overcrowded in SW Fresno. Notably, the percent of households...

Southwest: Vacant Lots

In this neighborhood, there are 370 acres of vacant land, with the average lot size of 5 acres. There is significant land available for residential development, however the private real esta...

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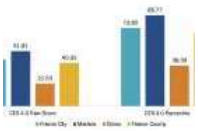


Southwest: Air Quality and Environment

Southwest Fresno has the highest CES score, indicating the highest levels of pollutants, as compared to the City and County.

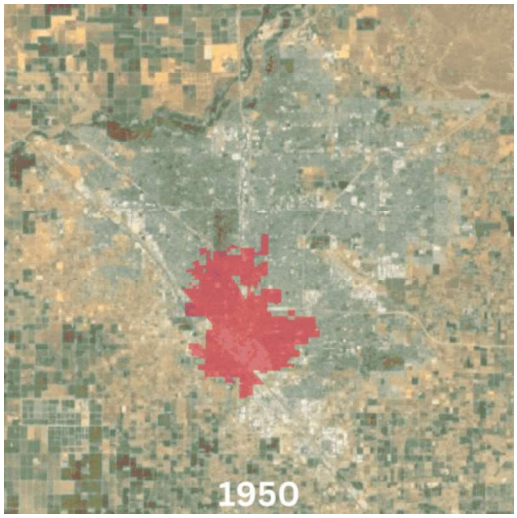
Southwest: Extreme Food Hardship

Based on the USDA 2019 data, many of the census tracts in Southwest Fresno experience food hardships as residents have longer distances to go to reach a grocery store. This issue is...

What Causes Urban Decay?

Inefficient Land Use (Sprawl)

Development in the City of Fresno originally moved from Downtown to the north, capping out at the San Joaquin River.



Next, development moved east from the central city. The annexation map shows the City of Fresno boundaries in 1950 in red and the land annexed by the City of Fresno over the last few decades is depicted in blue.

As the city has increased in land size, the population density has decreased in the central city and Southwest Fresno, and increased significantly on the periphery where the new annexed land is. This suggests that on average, more people are relocating from the central areas of the city to the newly annexed land, and that a larger share of migration on net is relocation to annexed areas. This dynamic can cause urban decay: residents of new annexed communities are is not new population and new household tax revenue coming to the City of Fresno, but just an internal repositioning of existing residents and tax revenue.

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Based on the migration data, new households moving to the City of Fresno have a lower household adjusted gross income (AGI) than the City of Fresno average median household income of $63,000 and lower than the County of Fresno average median household income of $65,000, with the exception of new migration to Fresno from the Bay Area ($71,025 per household AGI). Household AGIs of new households migrating to Fresno from the following regions falls between 63% and 86% of the median income of existing City of Fresno households:

- Sacramento Region: $49,107
- San Joaquin Region: $49,803
- Southern California Region: $53,958
- Other states: $51,249
- Foreign addresses: $39,938

Since new migration to the City of Fresno has a lower income than the City and County median income, these new households are unable to rent or buy housing at the high end of the market; they would thus likely be seeking rents/sales prices in the City of Fresno at or below the Fresno market median.

The data on population and migration shows that the existing residents of Fresno have moved out of central areas of the City to the newly annexed land, and that new migration to the City of Fresno has lower household median income than the city average, and would likely be seeking more affordable units.

Therefore, new developments in annexation areas cannot completely pay for themselves because, on average, they are not introducing new residents to the tax base but rather shifting residents around within the City. Also, as the City increases the number of square miles within its boundaries, it increases the miles of roads, infrastructure, and emergency services that it must finance, staff, and maintain. There is not data or studies that suggest these new communities are self-sufficient and pay for themselves over time.

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Flight

There is a long history of racial segregation in the City of Fresno and there has been an exodus of white households from the city boundaries as the city has become more diverse overtime.

At the city's inception, the railroad tracks were a divider; immigrants were forced to live west of the railroad tracks in West Fresno. Redlining from the 1930's exacerbated the racial divide in Fresno, as neighborhoods with large minority populations, including West and Southwest Fresno, were demarcated in red and denied mortgages. In the north, neighborhoods like Fig Garden were primarily white; these buyers were approved for loans, and their deeds had race-restricted covenants excluding certain races, which perpetuated the segregation of neighborhoods by race. In

1937, the city was comprised of 90% white residents; by 1970, Fresno had become a majority minority city. White residents continued to move even further from central Fresno, and by the 1970's. the dividing line between white communities and minority communities moved from the railroad tracks to Shaw Avenue, showing white flight out of the central city.[3] As of 2022, non-Latino white residents comprise only 30% of the population. As the demographics of the city have changed and became more diverse, and white residents have moved further north, they have left legacy neighborhoods behind and the geographic division between racial groups has become even clearer.

Higher-income households moving out of the legacy communities exacerbates decay, as there is a loss of property tax and sales tax revenue, and local spending, which in turn impacts local businesses and the level of services for these legacy communities. When schools see negative impacts to their funding from a loss of tax revenue, families with more mobility and financial options typically seek a stronger performing school district and leave, causing further harm to these school districts.

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Investment Patterns (Public and Private)

The pattern of public and private investment can disproportionately impact the physical, economic, and social trajectory of a community in several ways. On the upside, investments in parks, streets, public safety, and infrastructure have placemaking value. These are amenities that drive market premiums and create a virtuous cycle of private investment and reinvestment. On the downside, deferred maintenance, deferred upgrades, and antiquated infrastructure have negative impacts by drawing down market premiums while also creating additional costs, greater uncertainty, and increased risk for capital markets in attracting private investment, perpetuating the decay of the neighborhoods left behind.

At the same time, some investments have disproportionately

positive and negative impacts on different communities. In Fresno, Freeway 99 was constructed in the 1950's and created a physical barrier between east and west Fresno, further perpetuating the divide in the city and between racial groups. The construction of the freeway destroyed over 20 blocks of housing, as well as the Black community's business district.[4]

Location/Relocation of Institutional Uses

Institutional uses like government facilities, hospitals, higher education, and social services can serve as anchors for neighborhoods and districts in a city. These uses provide employment opportunities, attract students and faculty, and provide services to local residents. Together these institutions create daytime employment, support commercial uses, and create demand for housing and other services.

However, Fresno has a history of large-scale public and governmental users leaving the central city to move further north in the city.

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- In 1956, Fresno State College moved from its original location off McKinley Ave (in the Tower District west of Blackstone Ave) to its current location in Northeast Fresno, adjacent to Clovis.
- Hospitals have also left the central city for locations farther north, which moves thousands of jobs to more suburban locations and makes it harder for a subsect of the community, who are less likely to have a personal vehicle, to access medical care. Saint Agnes Medical Center opened in 1929 on Fruit and Floradora Avenues in Central Fresno.[5] In the 1970s, the Medical Center moved north to its current location on Herndon Ave in Northeast Fresno. Saint Agnes is currently one of the top 25 employers in Fresno County.[6]
- Also, in 1952, Valley Children's Hospital opened on Shields and Millbrook Avenues in Central Fresno but moved north to Madera County in 1998.[7] Today, the Valley Children's

Healthcare System has 3,500 employees, which could have been Fresno jobs, and represents the loss of Central California's only high-quality, comprehensive care exclusively for children to Madera County.[8]

- This trend of institutional uses leaving Central Fresno has continued into the 2000's; in 2021, Fresno County Social Services moved 2,200 employees from 40 dispersed buildings in the City of Fresno into a centralized one-stop location at an office park in Clovis. This move represented a loss of jobs in the City of Fresno and means that for some residents in Southeast and Southwest Fresno, it can take longer to access social services.

Location of Uses with Negative Externalities

While uses that benefit the communities of central Fresno, including universities, hospitals, and social services, have moved north, the City has a history of allowing disruptive uses in the central city.

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- In Southwest Fresno, land that was designated for agricultural uses has been approved for industrial uses, despite the neighborhood consisting primarily of residential uses and single-family homes.
- In 1937, the City bought 20 acres of land near West and Jensen Avenues, three miles southwest of the City of Fresno, for the Fresno Sanitary Landfill, which eventually grew to 140 acres. The landfill accepted all types of waste, including waste that causes negative externalities on the community including municipal solid waste, pesticides and herbicides, battery acids, and petroleum products. In 1983, the City discovered methane gas onsite and in 1984, the California Department of Health Services conducted a preliminary inspection of the site because neighboring residents submitted numerous complaint letters. Inspections of the groundwater determined that 20 hazardous substances in the water. The landfill closed in 1987.[9]

- In 1947, Sierra Meat Co. (eventually owned by Darling International) opened a plant outside the city limits and the city eventually incorporated the area surrounding it. In recent decades, community residents have expressed heavy opposition to the rendering plant operations for its environmental impacts. The plant processes animal products and creates a noxious smell for the community. The rendering factory will operate until its planned closure in December 31, 2023.[10]
- Currently, in the Southwest Fresno Focus Area there are over 300 acres of land occupied by industrial users, including food processing, manufacturing, warehousing, and distribution space (Source: CoStar, 2023).

References

[1] ABC 30, "Fresno City Council Approves Anti-Blight Ordinance," ABC30 Fresno, May 15, 2015, https://abc30.com/blight-fresno-central-home-owners/724786/.

[2] Jason Oliviera, "Fires in Vacant Buildings Are Rising in Fresno," ABC30 Fresno, December 4, 2019, https://abc30.com/fresno-structure-fire-vacant-building-homelsess-homeless/5734688/.

[3] Reis Thebault, "Fresno's Mason-Dixon Line," The Atlantic, August 20, 2018, https://www.theatlantic.com/politics/archive/2018/08/fresnos-segregation/567299/.

[4] Ibid.

[5] Saint Agnes Medical Center, "About Us," www.samc.com, accessed July 20, 2023, https://www.samc.com/about-us/.

[6] State of California, "Major Employers in California," 2023, https://labormarketinfo.edd.ca.gov/majorer/countymajorer.asp?CountyCode=000019.

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CONT

[7] Valley Children's Healthcare, “Our History,” accessed July 20, 2023, https://www.valleychildrens.org/about-us/history#:~:text=1952%3A%20Through%20fundraising%20efforts%20by.

[8] Valley Children's Healthcare, “Why Choose Valley Children’s,” accessed July 20, 2023, https://www.valleychildrens.org/about-us/why-choose-valley-childrens.

[9] City of Fresno, "2001 National Historic Landmark Nomination," https://www.fresno.gov/publicutilities/wp-content/uploads/sites/16/2020/12/2001-National-Historic-Landmark-Nomination-Fresno-Sanitary-Landfill.pdf.

[10] Dom McAndrew, “Fresno Meat Rendering Operation to Permanently Close,” Your Central Valley, April 21, 2020, https://www.yourcentralvalley.com/news/local-news/fresno-meat-rendering-operation-to-permanently-close/.

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CONT

STATE OF CALIFORNIA - DEPARTMENT OF GENERAL SERVICES
STANDARD AGREEMENT
STD 213 (Rev. 03/2019)

AGREEMENT NUMBER: 19-PGP-13413
PURCHASING AUTHORITY NUMBER (if applicable):

1. This Agreement is entered into between the Contracting Agency and the Contractor named below:

CONTRACTING AGENCY NAME
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

CONTRACTOR'S NAME
City of Fresno

2. The term of this Agreement is:

START DATE
Upon HCD Approval

THROUGH END DATE
12/31/2022

3. The maximum amount of this Agreement is:
$625,000.00

4. The parties agree to comply with the terms and conditions of the following exhibits, which are by this reference made a part of the Agreement.

EXHIBITS	TITLE	PAGES
Exhibit A	Authority, Purpose and Scope of Work	2
Exhibit B	Budget Detail and Payment Provisions	5
Exhibit C*	State of California General Terms and Conditions	GTC - 04/2017
Exhibit D	PGP Terms and Conditions	8
Exhibit E	Special Conditions	0
	TOTAL NUMBER OF PAGES ATTACHED	15

Items shown with an asterisk (*), are hereby incorporated by reference and made part of this agreement as if attached hereto.
These documents can be viewed at https://www.dgs.ca.gov/OLS/Resources

IN WITNESS WHEREOF, THIS AGREEMENT HAS BEEN EXECUTED BY THE PARTIES HERETO.

CONTRACTOR

CONTRACTOR NAME (if other than an individual, state whether a corporation, partnership,etc.)
City of Fresno

CONTRACTOR BUSINESS ADDRESS: 2600 Fresno Street | CITY: Fresno | STATE: CA | ZIP: 93721

PRINTED NAME OF PERSON SIGNING: Jennifer K Clark
TITLE: Planning & Development Director

CONTRACTOR AUTHORIZED SIGNATURE

DATE SIGNED: 5/11/2020

STATE OF CALIFORNIA

CONTRACTING AGENCY NAME
Department of Housing and Community Development

CONTRACTING AGENCY ADDRESS: 2020 W. El Camino Ave., Suite 130 | CITY: Sacramento | STATE: CA | ZIP: 95833

PRINTED NAME OF PERSON SIGNING: Synthia Rhinehart
TITLE: Contracts Manager, Business & Contract Services Branch

CONTRACTING AGENCY AUTHORIZED SIGNATURE

DATE SIGNED: 5/15/2020

California Department of General Services Approval (or exemption, if applicable)

Exempt per: SCM Vol. 1 4.04.A.3 (DGS memo dated 6/12/1981)

APPROVED AS TO FORM
CITY ATTORNEY'S OFFICE
BY:
SR DEP CITY ATTORNEY
Brandon M. Collett

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CONT

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CONT

EXHIBIT A

AUTHORITY, PURPOSE AND SCOPE OF WORK

1. Authority

Pursuant to Health and Safety Code section 50470, subdivision (b)(1)(A), the State of California Department of Housing and Community Development (the "Department" or "State") has established the Planning Grants Program ("PGP," or the "Program" as defined in Section 102 of the Guidelines) for Local Governments and Localities. This Standard Agreement, along with all its exhibits (the "Agreement"), is entered into under the authority of, and in furtherance of, the purpose of the Program. Pursuant to Health and Safety Code Section 50470, subdivision (d), the Department has issued the Senate Bill 2 Planning Grants Program Year 1 Guidelines (the "Guidelines") dated December 2018 governing the Program, and a Notice of Funding Availability ("NOFA") dated March 28, 2019.

2. Purpose

In accordance with the authority cited above, the Grantee has been awarded financial assistance in the form of a grant from the Program. The Department has agreed to make the grant to provide financial assistance for the preparation, adoption and implementation of a plan for Accelerating Housing Production and Streamlined Housing Production (as defined in Section 102 of the Guidelines) pursuant to the terms of the Guidelines, the NOFA, and this Agreement. By entering into this Agreement and thereby accepting the award of the Program funds, the Grantee agrees to comply with the terms and conditions of the Guidelines, the NOFA, this Agreement, the representations contained in the application, and the requirements of the authority cited above. Based on the representations made by the Grantee, the State shall provide a grant in the amount shown in Exhibit B, Section 2.

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CONT

3. Definitions

Terms herein shall have the same meaning as definitions in Section 102 of the Guidelines.

4. Scope of Work

Update planning documents, entitlement processes or zoning ordinances in accordance with the Grantee's Schedule F: Project Timeline and Budget, as provided by the Grantee in the SB 2 Planning Grant Program application used for subsequent approval by the Department.

5. Department Contract Coordinator

The Contract Coordinator of this Agreement for the Department is the Housing Policy Development Manager, or the Manager's designee. Unless otherwise informed, any

EXHIBIT A

notice, report, or other communication required by this Agreement shall be mailed by first class mail to the Department Contract Coordinator at the following address:

Department of Housing and Community Development
Housing Policy Development
Land Use Planning Unit
Attention: PGP Program Manager
2020 West El Camino Avenue, Suite 500
Sacramento, CA 95833
P. O. Box 952050
Sacramento, CA 94252-2050

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CONT

EXHIBIT B

BUDGET DETAIL AND PAYMENT PROVISIONS

1. **Application for Funds**

   A. The Department is entering into this Agreement on the basis of, and in reliance on facts, information, assertions and representations contained in the Application and any subsequent modifications or additions thereto approved by the Department. The Application and any approved modifications and additions thereto are hereby incorporated into this Agreement.

   B. The Grantee warrants that all information, facts, assertions and representations contained in the Application and approved modifications and additions thereto are true, correct, and complete to the best of the Grantee's knowledge. In the event that any part of the Application and any approved modification and addition thereto is untrue, incorrect, incomplete, or misleading in such a manner that would substantially affect the Department's approval, disbursement, or monitoring of the funding and the grant or activities governed by this Agreement, the Department may declare a breach hereof and take such action or pursue such remedies as are provided for breach hereof.

2. **Grant and Reimbursement Limit**

   The maximum total amount granted and reimbursable to the Grantee pursuant to this Agreement shall not exceed $625,000.

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CONT

3. **Grant Timelines**

   A. This Agreement is effective upon approval by all parties and the Department, which is evidenced by the date signed by the Department on page one, Standard Agreement, STD 213 (the "Effective Date").

   B. All Grant funds must be expended by June 30, 2022.

   C. The Grantee shall deliver to the Department all final invoices for reimbursement on or before February 28, 2022, to ensure meeting the June 30, 2022 deadline. Under special circumstances, as determined by the Department, the Department may modify the February 28, 2022 deadline.

   D. It is the responsibility of the Grantee to monitor the project and timeliness of draws within the specified dates.

EXHIBIT B

4. Allowable Uses of Grant Funds

A. The Department shall not award or disburse funds unless it determines that the grant funds shall be expended in compliance with the terms and provisions of the Guidelines, the NOFA, and this Agreement.

B. Grant funds shall only be used by the Grantee for project activities approved by the State that involve the preparation and adoption of project activities as stated in the scope of work, project description, project timeline and other parts of the application, and eligible activities and uses pursuant to Article III of the Guidelines.

C. Grant funds may not be used for administrative costs of persons employed by the Grantee for activities not directly related to the preparation and adoption of the proposed activity.

D. The Grantee shall use no more than 5 percent of the total grant amount for costs related to administration of the project.

E. A Grantee that receives funds under this Program may use a subcontractor. The subcontract shall provide for compliance with all the requirements of the Program. The subcontract shall not relieve the Grantee of its responsibilities under the Program.

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CONT

F. After the contract has been executed by the Department and all parties, approved and eligible costs for eligible activities may be reimbursed for the project(s) upon completion of deliverables in accordance with Schedule F: Project Timeline and Budget and the Statement of Work and subject to the terms and conditions of this Agreement.

G. Only approved and eligible costs incurred for work after the NOFA date, continued past the date of execution and acceptance of the Standard Agreement and completed during the grant term will be reimbursable.

H. Approved and eligible costs incurred prior to the NOFA date are ineligible.

5. Performance

The Grantee shall take such actions, pay such expenses, and do all things necessary to complete the scope of work specified in Exhibit A and as incorporated by the SB 2 Program application in accordance with the schedule for completion set forth therein and within the terms and conditions of this Agreement.

EXHIBIT B

6. Fiscal Administration

A. The Grantee is responsible for maintaining records which fully disclose the activities funded by the PGP grant. Adequate documentation for each reimbursable transaction shall be maintained to permit the determination, through an audit if requested by the State, of the accuracy of the records and the allowability of expenditures charged to PGP grant funds. If the allowability of expenditure cannot be determined because records or documentation are inadequate, the expenditure may be disallowed, and the State shall determine the reimbursement method for the amount disallowed. The State's determination of the allowability of any expense shall be final, absent fraud, mistake or arbitrariness.

B. Work must be completed prior to requesting reimbursement. The Department may make exceptions to this provision on a case by case basis. In unusual circumstances, the Department may consider alternative arrangements to reimbursement and payment methods based on documentation demonstrating cost burdens, including the inability to pay for work.

C. Prior to receiving reimbursement, the Grantee shall submit the following documentation:

1) Government Agency Taxpayer ID Form (GovTIN; Fi$cal form);

2) A Request for Funds on a form provided by the Department; and

3) Any and all documentation requested by the Department in the form and manner as outlined in the following subsection D.

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CONT

D. Grantee shall submit all required reimbursement documentation to the following address:

Department of Housing and Community Development
Housing Policy Development
Land Use Planning Unit
Attention: PGP Program Manager
2020 West El Camino Avenue, Suite 500
Sacramento, CA 95833
P. O. Box 952050
Sacramento, CA 94252-2050

E. The Grantee shall submit invoices for reimbursement to the Department according to the following schedule:

EXHIBIT B

1) At maximum, once per quarter; or

2) Upon completion of a deliverable, subject to the Department's approval; and

3) At minimum, one invoice for reimbursement annually.

The Department will use the 2019 calendar year beginning with January, with first requests for reimbursement accepted on or after September 30, 2019.

F. The request for reimbursement must be for a minimum of 15 percent of the maximum grant amount awarded. The Department may consider exceptions to the minimum amount requested on a case-by-case basis. All invoices shall reference the contract number and shall be signed and submitted to the Department's Program Manager at the address provided above in Section 6, item D of Exhibit B. Invoices shall include at a minimum the following information:

1) Names of the Grantee's personnel performing work;

2) Dates and times of project work;

3) Itemized costs in accordance with the Schedule F: Project Timeline and Budget and Statement of Work, including identification of each employee, contractor, subcontractor staff who provided services during the period of the invoice, the number of hours and hourly rates for each of the Grantee's employees, contractor(s), sub-recipient(s) or subcontractor's staff member(s), authorized expenses with receipts, and contractor, sub-recipient and subcontractor invoices; and

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CONT

4) Any other documents, certifications, or evidence deemed necessary by the Department prior to disbursement of grant funds.

G. The Department will reimburse the Grantee directly for all allowable project costs as promptly as the Department's fiscal procedures permit upon receipt of an itemized signed invoice.

H. The Department recognizes that budgeted deliverable amounts are based upon estimates. Grantees may request, in writing, a budget adjustment across deliverables subject to written approval by the Department, as long as the total budget does not exceed the maximum amount awarded to the Grantee.

I. Grant funds cannot be disbursed until this Standard Agreement has been fully executed.

EXHIBIT B

J. Grant fund payments will be made on a reimbursement basis; advance payments are not allowed. The Grantee, its subcontractors and all partners, must have adequate cash flow to pay all grant-related expenses prior to requesting reimbursement from the Department. The Department may consider alternative arrangements to reimbursement and payment methods based on documentation demonstrating cost burdens, including the inability to pay for work pursuant to Section 601(f) of the Guidelines.

K. The Grantee will be responsible for compiling and submitting all invoices, supporting documentation and reporting documents. Invoices must be accompanied by reporting materials where appropriate. Invoices without the appropriate reporting materials will not be paid.

1) Supporting documentation may include, but is not limited to; purchase orders, receipts, progress payments, subcontractor invoices, timecards, or any other documentation as deemed necessary by the Department to support the reimbursement to the Grantee for expenditures incurred.

L. The Grantee will submit for reimbursements to the Department based on actual costs incurred, and must bill the State based on clear and completed objectives and deliverables as outlined in the application, in Schedule F: Project Timeline and Budget, the Statement of Work, and/or any and all documentation incorporated into this Standard Agreement and made a part thereof.

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CONT

M. The Department may withhold 10 percent of the grant until grant terms have been fulfilled to the satisfaction of the Department.

EXHIBIT D

PGP TERMS AND CONDITIONS

1. Reporting

A. During the term of the Standard Agreement the Grantee shall submit, upon request of the Department, a performance report that demonstrates satisfaction of all requirements identified in this Standard Agreement.

B. Upon completion of all objectives and deliverables required to fulfill this contract pursuant to Schedule F: Project Timeline and Budget and the Scope of Work, Exhibit A, Section 4, and as referred to in Exhibit B, Section 6, subsection K. within this Standard Agreement, the Grantee shall submit a final close out report in accordance with Section 604, subsection (b), and as instructed in Attachment 3 of the December 2018 Planning Grants Program Guidelines. The close out report shall be submitted with the final invoice by the end of the grant term as listed in Exhibit B, Section 3, subsection C.

2. Accounting Records

A. The Grantee, its staff, contractors and subcontractors shall establish and maintain an accounting system and reports that properly accumulate incurred project costs by line. The accounting system shall conform to Generally Accepted Accounting Principles (GAAP), enable the determination of incurred costs at interim points of completion, and provide support for reimbursement payment vouchers or invoices. 43 CONT

B. The Grantee must establish a separate ledger account for receipts and expenditures of grant funds and maintain expenditure details in accordance with the scope of work, project timeline and budget. Separate bank accounts are not required.

C. The Grantee shall maintain documentation of its normal procurement policy and competitive bid process (including the use of sole source purchasing), and financial records of expenditures incurred during the course of the project in accordance with GAAP.

D. The Grantee agrees that the state or designated representative shall have the right to review and to copy any records and supporting documentation pertaining to the performance of the Standard Agreement.

E. Subcontractors employed by the Grantee and paid with moneys under the terms of this Standard Agreement shall be responsible for maintaining accounting records as specified above.

3. Audits

A. At any time during the term of the Standard Agreement, the Department may perform or cause to be performed a financial audit of any and all phases of the award. At the

EXHIBIT D

Department's request, the Grantee shall provide, at its own expense, a financial audit prepared by a certified public accountant. The State of California has the right to review project documents and conduct audits during and over the project life.

1) The Grantee agrees that the Department or the Department's designee shall have the right to review, obtain, and copy all records and supporting documentation pertaining to performance of this Agreement.

2) The Grantee agrees to provide the Department or the Department's designee, with any relevant information requested.

3) The Grantee agrees to permit the Department or the Department's designee access to its premises, upon reasonable notice, during normal business hours for the purpose of interviewing employees who might reasonably have information related to such records and inspecting and copying such books, records, accounts, and other material that may be relevant to a matter under investigation for the purpose of determining compliance with statutes, Program guidelines, and this Agreement.

B. If a financial audit is required by the Department, the audit shall be performed by an independent certified public accountant. Selection of an independent audit firm shall be consistent with procurement standards contained in Exhibit D, Section 8 subsection A. of this Standard Agreement.

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CONT

1) The Grantee shall notify the Department of the auditor's name and address immediately after the selection has been made. The contract for the audit shall allow access by the Department to the independent auditor's working papers.

2) The Grantee is responsible for the completion of audits and all costs of preparing audits.

3) If there are audit findings, the Grantee must submit a detailed response acceptable to the Department for each audit finding within 90 days from the date of the audit finding report.

C. The Grantee agrees to maintain such records for possible audit after final payment pursuant to Exhibit D, Section 3, subsection E. below, unless a longer period of records retention is stipulated.

1) If any litigation, claim, negotiation, audit, monitoring, inspection or other action has been started before the expiration of the required record retention period, all records must be retained by the Grantee, contractors and sub-contractors until completion of the action and resolution of all issues which arise from it. The Grantee shall include in any contract that it enters into in an amount exceeding $10,000, the Department's right to audit the contractor's records and interview their employees.

EXHIBIT D

2) The Grantee shall comply with the caveats and be aware of the penalties for violation of fraud and for obstruction of investigation as set forth in California Public Contracts Code Section 10115.10.

D. The determination by the Department of the eligibility of any expenditure shall be final.

E. The Grantee shall retain all books and records relevant to this Agreement for a minimum of (3) three years after the end of the term of this Agreement. Records relating to any and all audits or litigation relevant to this Agreement shall be retained for five years after the conclusion or resolution of the matter.

4. Remedies of Non-performance

A. Any dispute concerning a question of fact arising under this Standard Agreement that is not disposed of by agreement shall be decided by the Department's Housing Policy Development Manager, or the Manager's designee, who may consider any written or verbal evidence submitted by the Grantee. The decision of the Department's Housing Policy Development Manager or Designee shall be the Department's final decision regarding the dispute.

B. Neither the pendency of a dispute nor its consideration by the Department will excuse the Grantee from full and timely performance in accordance with the terms of this Standard Agreement.

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C. In the event that it is determined, at the sole discretion of the Department, that the Grantee is not meeting the terms and conditions of the Standard Agreement, immediately upon receiving a written notice from the Department to stop work, the Grantee shall cease all work under the Standard Agreement. The Department has the sole discretion to determine that the Grantee meets the terms and conditions after a stop work order, and to deliver a written notice to the grantee to resume work under the Standard Agreement.

D. Both the Grantee and the Department have the right to terminate the Standard Agreement at any time upon 30 days written notice. The notice shall specify the reason for early termination and may permit the grantee or the Department to rectify any deficiency(ies) prior to the early termination date. The Grantee will submit any requested documents to the Department within 30 days of the early termination notice.

E. There must be a strong implementation component for the funded activity through this Program, including, where appropriate, agreement by the locality to formally adopt the completed planning document. Localities that do not formally adopt the funded activity could be subject to repayment of the grant.

F. The following shall each constitute a breach of this Agreement:

1) Grantee's failure to comply with any of the terms and conditions of this Agreement.

2) Use of, or permitting the use of, grant funds provided under this Agreement for any

EXHIBIT D

ineligible costs or for any activity not approved under this Agreement.

3) Any failure to comply with the deadlines set forth in this Agreement unless approved by the Program Manager.

G. In addition to any other remedies that may be available to the Department in law or equity for breach of this Agreement, the Department may at its discretion, exercise the following remedies:

1) Disqualify the Grantee from applying for future PGP Funds or other Department administered grant programs;

2) Revoke existing PGP award(s) to the Grantee;

3) Require the return of unexpended PGP funds disbursed under this Agreement;

4) Require repayment of PGP Funds disbursed and expended under this agreement;

5) Seek a court order for specific performance of the obligation defaulted upon, or the appointment of a receiver to complete the obligations in accordance with the PGP Program requirements; and

6) Other remedies available at law, or by and through this agreement. All remedies available to the Department are cumulative and not exclusive.

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7) The Department may give written notice to the Grantee to cure the breach or violation within a period of not less than 15 days.

5. Indemnification

Neither the Department nor any officer or employee thereof is responsible for any injury, damage or liability occurring by reason of anything done or omitted to be done by the Grantee, its officers, employees, agents, its contractors, its sub-recipients or its subcontractors under or in connection with any work, authority or jurisdiction conferred upon the Grantee under this Standard Agreement. It is understood and agreed that the Grantee shall fully defend, indemnify and save harmless the Department and all of the Department's staff from all claims, suits or actions of every name, kind and description brought forth under, including, but not limited to, tortuous, contractual, inverse condemnation or other theories or assertions of liability occurring by reason of anything done or omitted to be done by the Grantee, its officers, employees, agents contractors, sub-recipients, or subcontractors under this Standard Agreement.

6. Waivers

No waiver of any breach of this Agreement shall be held to be a waiver of any prior or subsequent breach. The failure of the Department to enforce at any time the provisions of this Agreement, or to require at any time, performance by the Grantee of these provisions, shall in no way be

EXHIBIT D

construed to be a waiver of such provisions nor to affect the validity of this Agreement or the right of the Department to enforce these provisions.

7. Relationship of Parties

It is expressly understood that this Standard Agreement is an agreement executed by and between two independent governmental entities and is not intended to, and shall not be construed to, create the relationship of agent, servant, employee, partnership, joint venture or association, or any other relationship whatsoever other than that of an independent party.

8. Third-Party Contracts

A. All state-government funded procurements must be conducted using a fair and competitive procurement process. The Grantee may use its own procurement procedures as long as the procedures comply with all City/County laws, rules and ordinances governing procurement, and all applicable provisions of California state law.

B. Any contract entered into as a result of this Agreement shall contain all the provisions stipulated in the Agreement to be applicable to the Grantee's sub-recipients, contractors, and subcontractors. Copies of all agreements with sub-recipients, contracts, and subcontractors must be submitted to the Department's program manager.

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CONT

C. The Department does not have a contractual relationship with the Grantee's sub-recipients, contractors, or subcontractors, and the Grantee shall be fully responsible for all work performed by its sub-recipients, contractors, or subcontractors.

D. In the event the Grantee is partnering with another jurisdiction or forming a collaborative effort between the Grantee and other jurisdictions who are grantees of the SB 2 Planning Grants Program, the Grantee acknowledges that each partner and/or all entities forming the SB 2 Planning Grants Program collaborative are in mutual written agreement with each other but are contractually bound to the Department under separate, enforceable contracts.

E. In the event the Grantee is partnering with another jurisdiction or forming a collaborative effort with other entities that are not grantees of the SB 2 Planning Grants Program, the Department shall defer to the provisions as noted in subsections 8(B) and 8(C) of this part.

9. Compliance with State and Federal Laws, Rules, Guidelines and Regulations

A. The Grantee agrees to comply with all state and federal laws, rules and regulations that pertain to construction, health and safety, labor, fair employment practices, equal opportunity, and all other matters applicable to the grant, the Grantee, its contractors or subcontractors, and any other grant activity.

B. During the performance of this Agreement, the Grantee assures that no otherwise qualified person shall be excluded from participation or employment, denied program

EXHIBIT D

benefits, or be subjected to discrimination based on race, color, ancestry, national origin, sex, gender, gender identity, gender expression, genetic information, age, disability, handicap, familial status, religion, or belief, under any program or activity funded by this contract, as required by Title VI of the Civil Rights Act of 1964, the Fair Housing Act (42 USC 3601-20) and all implementing regulations, and the Age Discrimination Act of 1975 and all implementing regulations.

C. The Grantee shall include the nondiscrimination and compliance provisions of this clause in all agreements with its sub-recipients, contractors, and subcontractors, and shall include a requirement in all agreements with all of same that each of them in turn include the nondiscrimination and compliance provisions of this clause in all contracts and subcontracts they enter into to perform work under the PGP.

D. The Grantee shall, in the course of performing project work, fully comply with the applicable provisions of the Americans with Disabilities Act (ADA) of 1990, which prohibits discrimination on the basis of disability, as well as all applicable regulations and guidelines issued pursuant to the ADA. (42 U.S.C. 12101 et seq.)

E. The Grantee shall adopt and implement affirmative processes and procedures that provide information, outreach and promotion of opportunities in the PGP project to encourage participation of all persons regardless of race, color, national origin, sex, religion, familial status, or disability. This includes, but is not limited to, a minority outreach program to ensure the inclusion, to the maximum extent possible, of minorities and women, and entities owned by minorities and women, as required by 24 CFR 92.351. 43 CONT

10. Litigation

A. If any provision of this Agreement, or an underlying obligation, is held invalid by a court of competent jurisdiction, such invalidity, at the sole discretion of the Department, shall not affect any other provisions of this Agreement and the remainder of this Agreement shall remain in full force and effect. Therefore, the provisions of this Agreement are, and shall be, deemed severable.

B. The Grantee shall notify the Department immediately of any claim or action undertaken by or against it, which affects or may affect this Agreement or the Department, and shall take such action with respect to the claim or action as is consistent with the terms of this Agreement and the interests of the Department.

11. Changes in Terms/Amendments

This Agreement may only be amended or modified by mutual written agreement of both parties.

12. State-Owned Data

A. Definitions

EXHIBIT D

1) Work:

The work to be directly or indirectly produced by the Grantee, its employees, or by and of the Grantee's contractor's, subcontractor's and/or sub-recipient's employees under this Agreement.

2) Work Product:

All deliverables created or produced from Work under this Agreement including, but not limited to, all Work and Deliverable conceived or made, or made hereafter conceived or made, either solely or jointly with others during the term of this Agreement and during a period of six months after the termination thereof, which relates to the Work commissioned or performed under this Agreement. Work Product includes all deliverables, inventions, innovations, improvements, or other works of authorship Grantee and/or Grantee's contractor subcontractor and/or sub-recipient may conceive of or develop in the course of this Agreement, whether or not they are eligible for patent, copyright, trademark, trade secret or other legal protection.

3) Inventions:

Any ideas, methodologies, designs, concept, technique, invention, discovery, improvement or development regardless of patentability made solely by the Grantee or jointly with the Grantee's contractor, subcontractor and/or sub-recipient and/or Grantee's contractor, subcontractor, and/or sub-recipient's employees with one or more employees of the Department during the term of this Agreement and in performance of any Work under this Agreement, provided that either the conception or reduction to practice thereof occurs during the term of this Agreement and in performance of Work issued under this Agreement.

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B. Ownership of Work Product and Rights

1) All work Product derived by the Work performed by the Grantee, its employees or by and of the Grantee's contractor's, subcontractor's and/or sub-recipient's employees under this Agreement, shall be owned by the Department and shall be considered to be works made for hire by the Grantee and the Grantee's contractor, subcontractor and/or subrecipient for the Department. The Department shall own all copyrights in the work product.

2) Grantee, its employees and all of Grantee's contractor's, subcontractor's and sub-recipient's employees agree to perpetually assign, and upon creation of each Work Product automatically assigns, to the Department, ownership of all United States and international copyrights in each and every Work Product, insofar as any such Work Product, by operation of law, may not be considered work made for hire by the Grantee's contractor, subcontractor and/or subrecipient from the Department. From time to time upon the Department's request, the Grantee's contractor, subcontractor and/or subrecipients, and/or its employees, shall confirm such

EXHIBIT D

assignments by execution and delivery of such assignment, confirmations or assignment or other written instruments as the Department may request. The Department shall have the right to obtain and hold in its name all copyright registrations and other evidence of rights that may be available for Work Product under this Agreement. Grantee hereby waives all rights relating to identification of authorship restriction or limitation on use or subsequent modification of the Work.

3) Grantee, its employees and all Grantee's contractors, subcontractors and sub-recipients hereby agrees to assign to the Department all Inventions, together with the right to seek protection by obtaining patent rights therefore and to claim all rights or priority thereunder and the same shall become and remain the Department's property regardless of whether such protection is sought. The Grantee, its employees and Grantee's contractor, subcontractor and /or subrecipient shall promptly make a complete written disclosure to the Department of each Invention not otherwise clearly disclosed to the Department in the pertinent Work Product, specifically noting features or concepts that the Grantee, its employees and/or Grantee's contractor, subcontractor and/or subrecipient believes to be new or different.

4) Upon completion of all work under this Agreement, all intellectual property rights, ownership and title to all reports, documents, plans, specifications and estimates, produced as part of this Agreement will automatically be vested in Department and no further agreement will be necessary to transfer ownership to Department. 43 CONT

13. Special Conditions

The State reserves the right to add any special conditions to this Agreement it deems necessary to assure that the policy and goals of the Program are achieved.

SB 2 Planning Grants Program Application

State of California
Governor Gavin Newsom

Alexis Podesta, Secretary
Business, Consumer Services and Housing Agency

Ben Metcalf, Director
Department of Housing and Community Development

2020 West El Camino, Suite 500
Sacramento, CA 95833
Website: http://www.hcd.ca.gov/grants-funding/active-funding/planning-grants.shtml
Email: sb2planninggrant@hcd.ca.gov

March 28, 2019
Revised July 10, 2019

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SB 2 Planning Grants Application

Planning Grants Program Application Packaging Instructions

The applicant is applying to the Department of Housing and Community Development (Department) for a grant authorized underneath the Planning Grants Program (PGP) provisions of SB 2 (Chapter 364, Statutes of 2017). The PGP program is intended for the preparation, adoption, and implementation of plans that streamline housing approvals and accelerate housing production. Please refer to the SB 2 Planning Grants Program Guidelines and Notice of Funding Availability (NOFA) for detailed information on eligible activities, applicants, and awards. If you have questions regarding this application or the PGP, email sb2planninggrant@hcd.ca.gov.

If approved for funding, this grant application will be a part of your Standard Agreement with the Department. In order to be considered for funding, all sections of this application, including attachments and exhibits if required, must be complete and accurate.

Pursuant to Section X of the NOFA, all applicants must submit a complete, signed, original application package and an electronic copy on CD or USB flash drive containing the following documentation, in the order listed below, to the Department by the specified due date in the Notice of Funding Availability (NOFA) in order to be considered for award:

1) A complete, signed, original application (the Department will only accept this **fillable pdf** as the application) with the following attachments:

   a. **Attachment 1: State and Other Planning Priorities** (All applicants must submit this form to self-certify compliance)

   b. **Attachment 2: Nexus to Accelerating Housing Production - NOTE:** if the applicant is proposing only Priority Policy Areas (PPA), as defined in section VIII, subsection (3) of the NOFA, do not fill out Attachment 2. However, if the applicant is proposing to fund PPAs AND other activities that are not considered PPAs, the application must demonstrate how these other activities have a nexus to accelerating housing production by filling out Attachment 2 of this application.

2) A fully executed resolution authorizing application for, and receipt of, PGP funds (see Attachment 3: Sample Resolution).

3) A fully executed Government Agency Taxpayer ID Form (available as a download from the SB 2 Planning Grants webpage at http://www.hcd.ca.gov/grants-funding/active-funding/planning-grants.shtml).

4) If the applicant is partnering with another local government or other entity pursuant to Article II, Section 200 of the SB 2 Planning Grant Program Guidelines (the "Guidelines"), include a copy of the legally binding agreement.

5) Other documentation (e.g., letters of support, scope of work, etc.) if needed.

NOTE: All local governments must submit a separate, signed application package, notwithstanding whether it will partner with another form of government or entity. Only one application per locality will be accepted by the Department. Joint applications are not allowed.

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SB 2 Planning Grants Application

A. Applicant Information

Pursuant to Article II, Section 200 of the Guidelines, local governments may partner through legally binding agreements with other forms of governments or entities. However, all local governments must submit separate, signed application packages that identify their respective responsibilities and deliverables, even if partnering with other entities.

Is the applicant partnering with another eligible local government entity?		
☐	*Yes	***If Yes**, the application package must include a fully executed copy of the legally binding agreement. Provide the partners' name(s) and type(s) below for reference only.*
☑	No	

Complete the following Applicant information			
Applicant's Name		City of Fresno	
Applicant's Agency Type		local jurisdiction	
Applicant's Mailing Address		2600 Fresno St	
City		Fresno	
State	California	Zip Code	93721-3604
County		Fresno	
Website		www.fresno.gov	
Authorized Representative Name		Jennifer Clark	
Authorized Representative Title		Director, Planning & Development	
Phone	559-621-8003	Fax	559-457-1484
Email	jennifer.clark@fresno.gov		
Contact Person Name		Jennifer Clark	
Contact Person Title		Director, Planning & Development	
Phone	559-621-8003	Fax	559-457-1484
Email	jennifer.clark@fresno.gov		
Partner(s) Name *(if applicable)*			
Partner Agency Type			
Partner(s) Name *(if applicable)*			
Partner Agency Type			
Proposed Grant Amount	$	625,000	

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B. Applicant Certification

As the official designated by the governing body, I hereby certify that if approved by HCD for funding through the Planning Grants Program (PGP), the City of Fresno assumes the responsibilities specified in the 2019 Notice of Funding Availability and PGP guidelines, and certifies that the information, statements, and other contents contained in this application are true and correct.

Signature: _____ Name: Jennifer K Clark

Date: 9/23/19 Title: Director, Planning & Development Department

SB 2 Planning Grants Application

C. Threshold Requirements

Pursuant to Section 201(a) through (d) of the Guidelines, all applicants must meet the following threshold criteria in items 1-4 below to be eligible for an award.

1. *Does the applicant have an adopted housing element found to be in substantial compliance by the Department on or before the date of the applicant's submission of their SB 2 Planning Grant application?*

☑	Yes	Date of HCD Review Letter: 7/7/17
☐	No	
☐	The Applicant requests HCD to consider housing element compliance threshold as met due to significant progress achieved in meeting housing element requirements.	

2. *Has the applicant submitted to the Department the Annual Progress Report (APR) for the current or prior year on or before the date of submission of their SB 2 Planning Grant application?*

		APR	Date Submitted
☑	Yes		
	☑	2017 CY Report	3/30/18
	☑	2018 CY Report	4/1/19
☐	No		

3. *Is the applicant utilizing one of the Priority Policy Areas listed below (as defined in section VIII, subsection (3) of the NOFA)?*

☑	*Yes	***If** the applicant is proposing **only** Priority Policy Areas, do not fill out Attachment 2. However, if the applicant is proposing to fund PPAs AND other activities that are not considered PPAs, the application must demonstrate how these other activities have a nexus to accelerating housing production by filling out Attachment 2 of this application.*

Rezone to permit by-right	Objective design and development standards	Specific Plans or form based codes coupled with CEQA streamlining	Accessory Dwelling Units or other low-cost building strategies	Expedited processing	Housing related infrastructure financing and fee reduction strategies
☐	☐	☑	☐	☐	☑

☐	No	*If an applicant is not proposing Priority Policy Areas, the application must include an explanation and document the plans or processes' nexus and impact on accelerating housing production based on a reasonable and verifiable methodology and must submit Attachment 2 in the Application pursuant to section VIII, subsection (3) of the NOFA.*
☐	The applicant is proposing PPAs and other activities not considered PPAs and is demonstrating how these activities have a nexus to accelerating housing production by submitting *Attachment 2.*	

4. *Does the applicant demonstrate that the locality is consistent with State Planning or Other Priorities, as certified in Attachment 1?*	Yes	☑	*No	☐
***If No**, consistency may be demonstrated through activities (not necessarily proposed for SB 2 funding) that were completed within the last five years, as certified in Attachment 1.*				

5. *Is a completed and signed resolution included with the application package?* *See Attachment 3, "Sample Resolution"*	Yes	☑	No	☐

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CONT

SB 2 Planning Grants Application

D. Proposed Activities Checklist (Section VI, items (1) through (17) of the NOFA)

*Check all activities the locality is undertaking for their PGP efforts below. Activities must match **Section E. Project Description**, and **Section F. Timeline and Budget**.*

1	☑	updates to general plans, community plans, specific plans, local planning related to implementation of sustainable communities strategies, or local coastal plans
2	☐	updates to zoning ordinances
3	☑	environmental analyses that eliminate the need for project-specific review
4	☐	local process improvements that improve and expedite local planning
5	☐	a smaller geography with a significant impact on housing production including an overlay district, project level specific plan or development standards modifications proposed for significant areas of a locality, such as corridors, downtown or priority growth areas
6	☐	the creation or enhancement of a housing sustainability district pursuant to AB 73 (Chapter 371, Statutes of 2017)
7	☐	workforce housing opportunity zone pursuant to SB 540 (Chapter 369, Statutes of 2017)
8	☐	zoning for by-right supportive housing, pursuant to Government Code section 65651 (Chapter 753, Statutes of 2018)
9	☐	zoning incentives for housing for persons with special needs, including persons with developmental disabilities
10	☐	rezoning to meet requirements pursuant to Government Code Section 65583.2(c) and other rezoning efforts to facilitate supply and affordability
11	☐	rezoning for multifamily housing in high resource areas (according to Tax Credit Allocation Committee/Housing Community Development Opportunity Area Maps)
12	☐	pre-approved architectural and site plans
13	☐	regional housing trust fund plans
14	☐	funding plans for SB 2 Year 2 going forward
15	☑	infrastructure financing plans
16	☐	environmental hazard assessments; data collection on permit tracking; feasibility studies, site analysis, or other background studies that are ancillary and part of a proposed activity with a nexus to accelerating housing production
17	☐	Other activities demonstrating a nexus to accelerating housing production

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SB 2 Planning Grants Application

E. Project Description

Provide a description of the project and the scope of work to be performed below. Use Appendix A for additional information if necessary. ***Note****: If partnering with another local government or entity, be sure to clarify the responsibilities and deliverables of your locality pursuant to such partnership.*

The City of Fresno has completed an administrative draft of a Specific Plan which embodies a unique approach to planning in Fresno. Completion of the plan will require updates for new greenhouse gas emission reduction targets, the conversion from LOS to VMT, updated water conservation measures, completion of infrastructure assessment, fiscal nexus study and a Program EIR. At conclusion the package of Specific Plan, EIR and Nexus Study will increase density and accelerate housing production. The plan includes a commitment to sound public finance and fiscal accountability, a vision for complete neighborhoods and communities, and environmental responsibility at all levels.

The Plan is based upon a hierarchy of walkable mixed-use centers supported by a multi-modal transportation network. Centers which serve as commercial and civic focal points are designed to include a mix and intensity of uses and a diversity of housing types. The range of housing products integrated throughout the community offers flexibility in meeting the evolving needs of households in the region. Although Fresno's average housing costs are less than half those of the Bay Area and Southern California, its production has not kept up with demand. Providing lower cost housing in the center of the state will make Fresno a prime location for achieving the State's housing production goals.

The number of dwelling units and densities contemplated for the specific plan area are: a total of approximately 45,000 units broken down into six housing districts: Regional Center with 3500 units at 30-100 du/acre; Community Center with 5500 units at 25-80 du/acre; Neighborhood Center with 3200 units at 15-40 du/acre; Mixed Residential with 15,100 units at 8-60 du/acre; Neighborhood Residential with 16,800 units at 6-30 du/acre; and Rural Cluster with 100 units at 0.1-0.5 du/acre as an agricultural buffer zone. The Plan proposes to reduce annual household costs from transportation and utilities by 57% thereby increasing affordability for renters and homeowners. 43 CONT

In addition, the Plan proposes to reduce VMT by 57%, to reduce GHG emissions from cars and buildings by 60%, to reduce air pollution from cars and trucks by 83%, and to reduce water use by 59%.

To complete the Specific Plan, an EIR, an infrastructure assessment, and a fiscal nexus study must be completed prior to adoption. The City has not yet selected a consultant for this work but has current estimates based upon recent contracts. The City does not have funding to complete the work but has identified SB2 PGP as a uniquely compatible funding source.

The City proposes to prepare a Program EIR per CEQA Guidelines Section 15168. The proposed EIR will include a detailed programmatic evaluation of activities to be carried out through Specific Plan and will allow the City to incorporate feasible mitigation measures including a streamlining checklist to evaluate site specific operations within the scope of the program EIR. This use of streamlining will fast-track the production of much-needed housing for the City and the region.

Finally, since the Program EIR is for a Specific Plan, future development will also utilize an expanded exemption under Government Code Section 65457 that will apply to certain residential, commercial, and mixed-use projects that are consistent with a specific plan adopted pursuant to Government Code, Article 8, Chapter 3 and would be exempt from CEQA. This new exemption is outlined in the final text of Section 15182 of the CEQA Guidelines.

SB 2 Planning Grants Application

F. Project Timeline and Budget

Project Name							
Objective	**Responsible Party**	**Est. Cost**	**Begin**	**End**	**Deliverable**	***PPA**	**Notes**
Update of the SEDA Specific Plan	Applicant	$ 81,250	1/1/20	6/30/20	Admin Draft of the Specific Plan	Yes	
	Applicant	$ 15,000	7/1/20	9/30/20	Public Review Draft of Specific Plan	Yes	
	Applicant	$ 10,000	10/1/20	12/31/20	Response to Comments of Specific Plan	Yes	
Program EIR pursuant to CEQA Guidelines 15168	Applicant	$350,000	4/1/20	12/31/20	Necessary Technical Studies	Yes	
	Applicant	$ 25,000	1/1/21	3/30/21	Admin Draft of the EIR	Yes	
	Applicant	$ 25,000	4/1/21	6/30/21	Public Review Draft of the EIR	Yes	
Infrastructure Assessment	Applicant	$ 50,000	1/1/21	3/30/21	Admin Draft of Infrastructure Assessment	Yes	
Infrastructure Financing Plan and Fee Nexus Study	Applicant	$ 25,000	4/1/21	6/30/21	Admin Draft of Infrastructure Financing Plan and Nexus Study	Yes	
	Applicant	$ 12,500	7/1/21	9/30/21	Public Review Draft of Infrastructure Financing Plan and Nexus St	Yes	
Final Adoption of Specific Plan, EIR Inf. Assess & Financing Plan	Applicant		10/1/21	12/30/21	Adoption by City Council of Plan and associated documents	Yes	
Program Oversight and Reporting	Applicant	$ 31,250	10/1/19	6/30/22	project management and reporting as required by the grant	N/A	
	Other					N/A	
	Other					N/A	
	Other					N/A	
	Total Est. Cost $	625000					

**Priority Policy Area (PPA)*

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CONT

SB 2 Planning Grants Application

G. Legislative Information

District	#	Legislator Name
Federal Congressional District	22	Devin Nunes
State Assembly District	23	Jim Patterson
	31	Joaquin Arambula
State Senate District	8	Andreas Borgeas
	14	Melissa Hurtado

Applicants can find their respective State Senate representatives at https://www.senate.ca.gov/, and their respective State Assembly representatives at https://www.assembly.ca.gov/.

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SB 2 Planning Grants Application

Attachment 1: State and Other Planning Priorities Certification (Page 1 of 3)

Pursuant to Section 201(d) of the Guidelines, all applicants must demonstrate that the locality is consistent with State Planning or Other Planning Priorities by certifying that at least one activity was completed in 1) State Planning Priorities (i.e., Infill and Equity, Resource Protection, Efficient Development Patterns) or 2) Other Planning Priorities (i.e., Affordability, Conservation, or Climate Change). Consistency may be demonstrated through activities (not necessarily proposed for SB 2 funding) that were completed within the last five years.

Complete the following self-certification by selecting one or more of the policy areas in the following tables by inserting the date completed for each applicable action, briefly describing the action taken, and certifying.

State Planning Priorities

Date Completed	Brief Description of the Action Taken
Promote Infill and Equity	
Rehabilitating, maintaining, and improving existing infrastructure that supports infill development and appropriate reuse and redevelopment of previously developed, underutilized land that is presently served by transit, streets, water, sewer, and other essential services, particularly in underserved areas.	
Seek or utilize funding or support strategies to facilitate opportunities for infill development.	
4/3/19	Received $66.5 million from Transformative Climate Communities to provide enhanced services and infrastructure for disadvantaged neighborhoods in Downtown and Southwest
Other (describe how this meets subarea objective)	
Promote Resource Protection	
Protecting, preserving, and enhancing the state's most valuable natural resources, including working landscapes such as farm, range, and forest lands; natural lands such as wetlands, watersheds, wildlife habitats, and other wildlands; recreation lands such as parks, trails, greenbelts, and other open space; and landscapes with locally unique features and areas identified by the state as deserving special protection.	
Actively seek a variety of funding opportunities to promote resource protection in underserved communities.	
Other (describe how this meets subarea objective)	
Encourage Efficient Development Patterns	
Ensuring that any infrastructure associated with development, other than infill development, supports new development that does the following:	
(1) Uses land efficiently.	
2/4/16	Completed adoption of the Development Code and city-wide rezoning to bring all parcels into compliance with the 12/18/14 General Plan with no sphere expansion.

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CONT

SB 2 Planning Grants Application

Attachment 1: State and Other Planning Priorities Certification (Page 2 of 3)

(2) Is built adjacent to existing developed areas to the extent consistent with environmental protection.	
(3) Is located in an area appropriately planned for growth.	
(4) Is served by adequate transportation and other essential utilities and services.	
12/15/19	Final close-out of Bus Rapid Transit implementation along major transit corridors to support up to 10,000 TOD units and link disadvantaged communities
(5) Minimizes ongoing costs to taxpayers.	
Other (describe how this meets subarea objective)	

Other Planning Priorities

Affordability and Housing Choices	
Incentives and other mechanisms beyond State Density Bonus Law to encourage housing with affordability terms.	
Efforts beyond state law to promote accessory dwelling units or other strategies to intensify single-family neighborhoods with more housing choices and affordability.	
Upzoning or other zoning modifications to promote a variety of housing choices and densities.	
10/20/16	Approved Downtown Neighborhoods Community Plan and Code to allow housing in the area "by right" and remove discretionary approvals.
Utilizing surplus lands to promote affordable housing choices.	
Efforts to address infrastructure deficiencies in disadvantaged communities pursuant to Government Code Section 65302.10.	
Other (describe how this meets subarea objective)	

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CONT

SB 2 Planning Grants Application

Attachment 1: State and Other Planning Priorities Certification (Page 3 of 3)

Conservation of Existing Affordable Housing Stock	
Policies, programs or ordinances to conserve stock such as an at-risk preservation ordinance, mobilehome park overlay zone, condominium conversion ordinance and acquisition and rehabilitation of market rate housing programs.	
Policies, programs and ordinances to protect and support tenants such as rent stabilization, anti-displacement strategies, first right of refusal policies, resources to assist tenant organization and education and "just cause" eviction policies.	
Other (describe how this meets subarea objective)	
Climate Adaptation	
Building standards, zoning and site planning requirements that address flood and fire safety, climate adaptation and hazard mitigation.	
Long-term planning that addresses wildfire, land use for disadvantaged communities, and flood and local hazard mitigation.	
Community engagement that provides information and consultation through a variety of methods such as meetings, workshops, and surveys and that focuses on vulnerable populations (e.g., seniors, people with disabilities, homeless, etc.).	
Other (describe how this meets subarea objective)	

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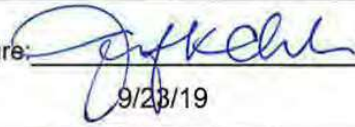
CONT

State and Other Planning Priorities Certification

I certify under penalty of perjury that all of the information contained in this PGP State Planning and Other Planning Priorities certification form (pages 9, 10, and 11 of this application) is true and correct.

Certifying Officials Name: Jennifer K Clark

Certifying Official's Title: Director, Planning and Development Department

Certifying Official's Signature: 

Certification Date: 9/23/19

SB 2 Planning Grants Application

Attachment 2: Application Nexus to Accelerating Housing Production

Fill out Attachment 2 only if the applicant answered "No" to item 3 in Section C or is utilizing Policy Priority Areas AND other activities not designated as such. Applicants answering "Yes" to question 3 in Section C and utilizing ONLY Priority Policy Areas are automatically deemed to demonstrate a nexus to accelerating housing production, and do not need to complete this form.

Pursuant to section VIII, subsection (4) of the NOFA, applicants shall demonstrate how the application includes a nexus to accelerating housing production. Please complete the following chart by providing information about the current conditions and expected outcomes with respect to the planned activity and housing production. Please attach documentation as necessary and see the NOFA for additional details.
Quantify how the activity accelerates production below and use Appendix B to explain the activity and its nexus to accelerating housing production if necessary.

Type (Select at least one)	*Baseline	**Projected	***Difference	Notes
Timing (e.g., reduced number of processing days)				
Development cost (e.g., land, fees, financing, construction costs per unit)				
Approval certainty and reduction in discretionary review (e.g., prior versus proposed standard and level of discretion)				
Entitlement streamlining (e.g., number of approvals)				
Feasibility of development				
Infrastructure capacity (e.g., number of units)				
Impact on housing supply and affordability (e.g., number of units)				

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CONT

**** Baseline – Current conditions in the jurisdiction***
(e.g. 6-month development application review, or existing number of units in a planning area)

*****Projected – Expected conditions in the jurisdiction because of the planning grant actions***
(e.g. 2-month development application review)

******Difference – Potential change resulting from the planning grant actions***
(e.g., 4-month acceleration in permitting, creating a more expedient development process)

SB 2 Planning Grants Application

Appendix A

Use this area for additional information if necessary.

To implement a large-scale master planned community including infrastructure improvements and annexation, an analysis of the currently existing infrastructure, the infrastructure necessary to support development, and the gap is required. Additionally, the General Plan of the City of Fresno requires that all new annexations are fiscally neutral expansions to the City's General Fund budget. This requires a fiscal nexus study to show the anticipated costs and revenues associated with the annexation and mechanisms to fund any needed infrastructure gaps.

A scope of work will include some or all of the following: statistical data; maps; existing public services, level of service and cost; crime statistics; roadway condition analysis; traffic management deficiencies; capital improvement requirements; utility assessment; water, wastewater, and storm water system assessment; urban service needs; service requirement costs; estimated revenues; special issues, if any. Additionally, a scope of work will include mechanisms to support the growth such as Enhanced Infrastructure Financing Districts (EIFDs), Community Facilities Districts (CFDs), Mello-Roos Districts, bonding capacity, etc.

In addition, the study may provide analysis and evaluation of the annexation area based on the following criteria: 1. the ability of the City to provide public services at a level equal to or better than that available from current service providers; the ability of the City to provide public services at the City's current levels of service; whether the annexation will cause a financial burden or a reduction in level of service to the City or existing residents; the relative costs and affordability to serve the proposed annexation versus the revenue to be derived from annexation, the capital cost and affordability to the City of making required infrastructure improvements and/or addressing infrastructure deficiencies.

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CONT

FRESNO STATE
Central Valley Health Policy Institute

September 6, 2023

City of Fresno
c/o Adrienne Asadoorian, Planner
2600 Fresno Street
Third Floor, Room 3065
Fresno, CA 93721

Sent by email: adrienne.asadoorian@fresno.gov

RE: Southeast Development Area Draft Program Environmental Impact Report

Dear Ms. Asadoorian,

I am the Assistant Director of the Central Valley Health Policy Institute. CVHPI's mission includes improving equity in health by developing the region's capacity for policy analysis and program development, implementation, and evaluation. I have reviewed the data supporting the Air Quality section of the July 14, 2023, draft Program EIR for the Southeast Development Area, and offer these comments.

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CONT

The draft PEIR includes calculations for annual tons of nitrogen oxides (NOx) and reactive organic gases (ROG), but it fails to calculate the ozone pollution that will result from these two precursor pollutants and to factor in the increasing number of extremely hot days each summer as climate change impacts Central Valley weather. In this region, quantifying ozone pollution arising from new development is crucial to establishing the impacts on human health the proposed development will create. The PEIR must thus include projected ozone production, based on the tons/year figures for NOx and ROG, as well as summer averages in tons/day that factor in escalating excess heat events over the pertinent years. There are tools readily available for such calculations, including but not limited to The Community Multiscale Air Quality Modeling System (CMAQ).

Studies document that incremental increases in ozone levels alone—independent of the other pollutants the project will create—will have the following human health impacts: decreased lung function, decreased lung function growth in children,[1] increased asthma-related emergency visits and hospital admissions,[2] and mortality among older adults.[3] In Fresno County, a rigorously sound study conducted by Entwistle et al. (2019) showed

[1] https://www.sciencedirect.com/science/article/pii/S0012369221036266

[2] https://link.springer.com/article/10.1007/s11869-019-00685-w

[3] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3581312/

Central Valley Health Policy Institute
California State University, Fresno
1625 East Shaw Avenue, Suite 146 M/S OF126 • Fresno, California 93710-8106
P 559.228.2150 F 559.228.2168 *www.FresnoState.edu/chhs/cvhpi/*

that people living in commercial areas are significantly more sensitive to ozone exposure than people living in residential areas.

Beyond the health effects of ozone, it is also well-established that PM2.5 is associated with increased mortality and morbidity due to respiratory, cardiovascular, cerebrovascular disorders and diabetes.

Although the Draft PEIR calculated project emissions in tons or metric tons per year for roughly a dozen air pollutants, and it recites the human health effects of many of them in a general way, it does not analyze human health effects for any of the pollutants at the levels and over the timeframes specifically pertinent to this project. Such analysis can and must be conducted, and the tools with which to conduct it are readily available. For example, the Environmental Benefits Mapping and Analysis Program – Community Edition (BenMAP-CE) – not only estimates health impacts but also estimates economic values associated with health morbidity events.

In addition, when considering health and vulnerability, there are zero reasons to introduce any form of air pollution in the demarcated area. There are hotspots or communities that are more highly concentrated with pollutants than others. There are state (CalEnviroScreen)[4] and federal (Climate and Economic Justice Screening Tool)[5] cumulative pollution measuring tools that demonstrate that large parts of this area in particular are already highly impacted. According to the CalEnviroScreen, the census tract 6019005904 (where much of the development will occur) has ozone levels worse than 89 percent of all census tracts in California. In this community, PM2.5 is worse than 95 percent of all other census tracts in California. When comparing this census tract to the rest of the nation, the community of 6019005904 has higher levels of PM2.5 than 99 percent of all census tracts.

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CONT

Increasing PM2.5 levels in these locations is highly likely to result in significant increases in cardiopulmonary morbidity and mortality and the incidence and development of diabetes mellitus.[6] Particularly, perinatal health and the health of children is of greatest concern and risk. Studies that include Fresno County populations have shown that air pollutants are linked to increased odds in neural tube defects[7] and preterm birth.[8] For more than a

[4] https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40

[5] https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5

[6] https://www.sciencedirect.com/science/article/abs/pii/S014765131630029X

[7] https://academic.oup.com/aje/article/177/10/1074/101390

decade, The Children's Health and Air Pollution Study (CHAPS) has documented the adverse health effects on children that ambient air pollution has in Fresno including lung function, chemical modification of DNA (methylation), metabolic dysfunction, and oxidative stress.[9]

The toll on human health this project's pollution will take on the population of the area, and on children, appears to be quite serious and pervasive. The City must insist on thorough and accurate analysis, and robust mitigation of air quality impacts before approval.

Please include these comments in the record of this project. Thank you.

Sincerely,

Emanuel Alcala, PhD
Assistant Director
Central Valley Health Policy Institute
1625 E. Shaw Ave Ste. 146
Fresno, CA 93710
Phone: 559.228.2137
RWHF Health Policy Research Scholar
https://healthpolicyresearch-scholars.org/scholars/emanuel-alcala-2/

cvhpi.org

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CONT

[8] https://www.nature.com/articles/s41370-021 00323-7

[9] https://www.chapssjv.org/publications

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A.2 - GSEJA Letter

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BLUM, COLLINS & HO LLP
ATTORNEYS AT LAW
AON CENTER
707 WILSHIRE BOULEVARD
SUITE 4880
LOS ANGELES, CALIFORNIA 90017
(213) 572-0400

March 21, 2025

Sophia Pagoulatos
Planning Manager
City of Fresno
Planning and Development Department
2600 Fresno Street, Third Floor, Room 3043
Fresno, CA 93721

Via Email to:
sophia.pagoulatos@fresno.gov

Subject: Comments on Recirculated Fresno Southeast Development Area Specific Plan Project EIR (SCH NO. 2022020486)

Dear Ms. Pagoulatos,

Thank you for the opportunity to comment on the Recirculated Program Environmental Impact Report (EIR) for the proposed Recirculated Fresno Southeast Development Area Specific Plan Project. Please accept and consider these comments on behalf of Golden State Environmental Justice Alliance. Also, Golden State Environmental Justice Alliance formally requests to be added to the public interest list regarding any subsequent environmental documents, public notices, public hearings, and notices of determination for this project. Send all communications to Golden State Environmental Justice Alliance P.O. Box 79222 Corona, CA 92877.

1.0 Summary

The proposed project is a Specific Plan (SP) for the Southeast Development Area (SEDA) formerly known as the Southeast Growth Area (SEGA). The mixed-use SEDA SP would permit residential, commercial, and employment generating uses. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. 1
The EIR lists the following items as additional components of the project:

1. Phasing Plan: The Phasing Plan defines the required sequence of development for various areas within SEDA.
2. Infrastructure Financing Plan: The proposed project would include a Public Facilities Financing Plan to present a strategy and funding options for backbone infrastructure and public facilities, including roads, sewer, water, storm drainage, parks, and other public facilities.

Backbone infrastructure and public facilities required for development would be funded through a combination of public and private funding. The Public Facilities Financing Plan has been developed through a review of the SEDA Specific Plan, infrastructure studies, and coordination with the City.

3. Annexation: The proposed project requires annexation of Fresno County (County) lands into the City. LAFCo is a Responsible Agency under CEQA for the proposed project. LAFCo will consider the analysis contained in this EIR when considering the annexation of the project site into the City. Annexation will be strategic and proactive to facilitate infrastructure development by the City.
4. General Plan Amendment and Development Code Change: The proposed project would also amend the General Plan and Development Code to implement the land use and zoning described in the proposed project.

1 CONT

1.4 Documents Incorporated by Reference

The EIR states that the Southeast Development Area Specific Plan (SEDA SP) document itself (2023) is incorporated by reference. The SEDA SP *is* the proposed project and excluding it as an attachment for public review does not comply with CEQA's requirements for meaningful disclosure. Incorporation by reference (CEQA § 15150 (f)) is not appropriate as the SEDA SP document contributes directly to analysis of the problem at hand. The EIR must be revised to include the SEDA SP document for review, analysis, and comment by the public and decision makers.

2

2.0 Project Description

The EIR is not clear regarding the proposed General Plan land use designations for the project site. Specifically, the EIR only provides exhibits that depict the Existing General Plan land use designations and the proposed SEDA SP land use designations, leaving the reader to assume that the proposed SEDA land uses *are* the new General Plan land use designations. It must be noted that the City's General Plan does not list any of the 10 proposed SEDA land use designations as existing land use designations. For example, SEDA's employment-focused land use designations are "Office Center" and "Flexible Research and Development." These land use designations do not exist in the City's General Plan, and neither do any of the other eight proposed land use designations. The City's General Plan also does not include a broad "Specific Plan" land use designation that would be applied to all parcels within any approved Specific Plan within the City. Therefore, all 10 land use designations proposed in the SEDA SP will be new additions to the General Plan and the EIR must be revised to include all text and exhibits that will be part of the revised General Plan and Development Code in order to comply with CEQA's requirements for meaningful disclosure and adequate informational documents (CEQA § 15121).

3

Further, the EIR impact analysis throughout the document relies on the notion that bus rapid transit (BRT) service will be expanded in Fresno to serve the project area (Kings Canyon), rendering several impact areas less than significant. However, the EIR does not provide any meaningful evidence to support the conclusion that the BRT expansion will actually be constructed. Most notably, the Fresno COG Long Range Transportation Plan[1] (LRTP) (2019-2050) does not include service to the SEDA SP area as a specific project. Table 2 - LRTP Project List within the LRTP only includes, "Project 6: Extend the Kings Canyon BRT corridor to Fancher Creek," and the Fancher Creek area is located north/west of the SEDA areas and not contiguous to it. Therefore, BRT service to the project area is not a funded commitment or project and is not planned to exist by 2050. The EIR must be revised to clarify this and update its impact analysis throughout the document. 3 CONT

Additionally, the EIR lists several items as "additional components" of the project that are not included for public review: Phasing Plan, Infrastructure Financing Plan, Annexation, and the above-mentioned General Plan Amendment and Development Code Change. These project components are necessary for the public to review as they directly inform the environmental analysis, such as Utilities and Service Systems, Hydrology and Water Quality, and Public Services. Excluding these project components as attachments for public review does not comply with CEQA's requirements for meaningful disclosure. Incorporation by reference (CEQA § 15150 (f)) is not appropriate as all project components contribute directly to analysis of the problem at hand. The EIR must be revised to include all project components for review, analysis, and comment by the public and decision makers. 4

3.3 Air Quality, 3.6 Energy, and 3.8 Greenhouse Gas Emissions

The EIR does not include for analysis relevant environmental justice issues in reviewing potential impacts, including cumulative impacts from the proposed project. The EIR provides general information about the census tract's CalEnviroScreen scores but does not provide meaningful analysis regarding the health impacts and effects of severe pollution rates. This is in conflict with CEQA Guidelines Section 15131 (c), which requires that "Economic, social, and particularly housing factors shall be considered by public agencies together with technological and environmental factors in deciding whether changes in a project are feasible to reduce or avoid the significant effects on the environment identified in the EIR. If information on these factors is not contained in the EIR, the information must be added to the record in some other manner to allow the agency to consider the factors in reaching a decision on the project." 5

[1] https://www.fresnocog.org/wp-content/uploads/2021/10/Fresno-County-Regional-Long-Range-Transit-Plan-050519-RL-34.pdf

This is especially significant as the surrounding community is highly burdened by pollution. According to CalEnviroScreen 4.0[2], CalEPA's screening tool that ranks each census tract in the state for pollution and socioeconomic vulnerability, the proposed project spans multiple census tracts ((6019005904 (Temperance south of Church Street extending east to McCall); 6019001413 (Temperance north of Church Street extending north to Belmont); and 6019001500 (Temperance between Jensen and North extending west to Peach)) that rank significantly worse than the rest of the state in overall pollution burden and specific factors that directly contribute to pollution applied to the socioeconomic factors of the population. Census tract 6019005904 ranks in the 77th percentile for overall pollution burden, census tract 6019001413 ranks in the 57th percentile, and census tract 6019001500 ranks in the 100th percentile, meaning that it is among the most highly polluted census tracts in the state.

The project census tracts rank highly for ozone burden (6019005904 and 6019001413: 89th percentile; 6019001500: 85th percentile), particulate matter (PM) 2.5 burden (6019005904: 95th percentile; 6019001413 and 6019001500: 96th percentile), and diesel PM burden (6019001500: 65th percentile). All of these environmental factors are typically attributed to heavy truck activity in the area. Ozone can cause lung irritation, inflammation, and worsening of existing chronic health conditions, even at low levels of exposure[3]. The very small particles of diesel PM can reach deep into the lung, where they can contribute to a range of health problems. These include irritation to the eyes, throat and nose, heart and lung disease, and lung cancer[4]. 5 CONT

The census tracts also bear more impacts from cleanup sites compared to the rest of the state (6019005904: 89th percentile; 6019001500: 98th percentile). Chemicals in the buildings, soil, or water at cleanup sites can move into nearby communities through the air or movement of water[5]. The census tracts also rank highly for impacts from toxic releases (6019005904: 70th percentile; 6019001413: 74th percentile; 6019001500: 95th percentile). People living near facilities that emit toxic releases may breathe contaminated air regularly or if contaminants are released during an accident[6].

The census tracts rank among the most severely impacted in several areas that impact water quality. Census tract 6019001500 rank in the 94th percentile for groundwater threats. People who live near contaminated groundwater may be exposed to chemicals moving from the soil into the air

[2] CalEnviroScreen 4.0 https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40
[3] OEHHA Ozone https://oehha.ca.gov/calenviroscreen/indicator/air-quality-ozone
[4] OEHHA Diesel Particulate Matter https://oehha.ca.gov/calenviroscreen/indicator/diesel-particulate-matter
[5] OEHHA Cleanup Sites https://oehha.ca.gov/calenviroscreen/indicator/cleanup-sites
[6] OEHHA Toxic Releases https://oehha.ca.gov/calenviroscreen/indicator/toxic-releases-facilities

inside their homes[7]. Additionally, the project census tracts rank highly for drinking water impacts (6019005904: 99th percentile; 6019001413: 94th percentile; 6019001500: 100th percentile), which indicates that the project site ranks with the worst quality drinking water in the state. Poor communities and people in rural areas are exposed to contaminants in their drinking water more often than people in other parts of the state[8].

The census tracts also rank highly for solid waste facility impacts (6019005904: 70th percentile; 6019001500: 100th percentile), which can expose people to hazardous chemicals, release toxic gases into the air (even after these facilites are closed), and chemicals can leach into soil around the facility and pose a health risk to nearby populations[9]. Census tract 6019001500 ranks in the 100th percentile for hazardous waste impacts. Hazardous waste generators and facilities contribute to the contamination of air, water and soil near waste generators and facilities can harm the environment as well as people[10].

5
CONT

Further, the census tract is a diverse community including many Hispanic residents (6019005904: 32%; 6019001413: 46%; 6019001500: 75%), Asian-American residents (6019005904: 24%; 6019001413: 25%; 6019001500: 3%), and African-American residents (6019005904: 2%; 6019001413: 2%; 6019001500: 1%), whom are especially vulnerable to the impacts of pollution. The communities have a high rate of low educational attainment, meaning significant portions of the census tracts over age 25 has not attained a high school diploma (6019005904: 56%; 6019001413: 54%; 6019001500: 95%). The community also has a high rate of poverty, meaning significant portions of the households in the census tract have a total income before taxes that is less than the poverty level (6019001500: 94%). Income can affect health when people cannot afford healthy living and working conditions, nutritious food and necessary medical care[11]. Poor communities are often located in areas with high levels of pollution[12]. Poverty can cause stress that weakens the immune system and causes people to become ill from pollution[13]. Living in poverty and low education levels are also an indication that residents may lack health insurance or access to medical care. Medical care is vital for the project census tracts as they rank significantly for the incidence of cardiovascular disease (6019001413: 55th percentile;

[7] OEHHA Groundwater Threats https://oehha.ca.gov/calenviroscreen/indicator/groundwater-threats
[8] OEHHA Drinking Water https://oehha.ca.gov/calenviroscreen/drinking-water
[9] OEHHA Solid Waste Facilities https://oehha.ca.gov/calenviroscreen/indicator/solid-waste-sites-and-facilities
[10] OEHHA Hazardous Waste Generators and Facilities https://oehha.ca.gov/calenviroscreen/indicator/hazardous-waste-generators-and-facilities
[11] OEHHA Poverty https://oehha.ca.gov/calenviroscreen/indicator/poverty
[12] Ibid.
[13] Ibid.

6019001500: 71st percentile) and the incidence of asthma (6019001413: 55th percentile; 6019001500: 93rd percentile). The communities also have a high rate of linguistic isolation, meaning significant portions of residents in the census tracts speak little to no English and faces further inequities as a result (6019005904: 49%; 6019001413: 50%; 6019001500: 70%).

Additionally, the proposed project's census tracts (6019001413 and 6019001500) are identified as SB 535 Disadvantaged Communities[14]. This indicates that cumulative impacts of development and environmental impacts in the area are disproportionately impacting these communities. The EIR does not discuss that the project site and surrounding area are disadvantaged communities and does not utilize this information in its analysis. The EIR has not considered the project's significant and unavoidable cumulatively considerable environmental impacts in relation to the SB 535 status of the project census tracts and surrounding area. The negative environmental, health, and quality of life impacts in the City have become distinctly inequitable. The severity of environmental impacts particularly on these Disadvantaged Communities must be included for analysis as part of a revised EIR. 5 CONT

The State of California lists three approved compliance modeling softwares[15] for non-residential buildings: CBECC-Com, EnergyPro, and IES VE. CalEEMod and EMFAC are not listed as approved softwares. The CalEEMod/EMFAC and spreadsheet-based modeling does not comply with the 2022 Building Energy Efficiency Standards and under-reports the project's significant Energy impacts and fuel consumption to the public and decision makers. Since the EIR did not accurately or adequately model the energy impacts in compliance with Title 24, a finding of significance must be made. A revised EIR with modeling using one of the approved software types must be prepared and circulated for public review in order to adequately analyze the project's significant environmental impacts. This is vital as the EIR utilizes CalEEMod/EMFAC as sources in its methodology and analysis, which are clearly not approved softwares. 6

3.9 Hazards and Hazardous Materials

The EIR states that, "According to the Fresno Yosemite International Airport Safety Compatibility Zones Map, a small portion of the Plan Area is located within the 60 dB CNEL contour. A Larger portion of the Plan Area is located within the Traffic Pattern Zone." The EIR concludes that, "The ALUC found the proposed project to be consistent with the ALUCP on August 7, 2023. Therefore, at the programmatic level, impacts to the Plan Area would be less than significant. Consistent with the General Plan and SEDA Specific Plan policies, individual development projects would be 7

[14] OEHHA SB 535 Census Tracts https://oehha.ca.gov/calenviroscreen/sb535
[15] California Energy Commission 2022 Energy Code Compliance Software https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency-1

required to undergo project-specific environmental review, which may require additional site-specific or project-specific airport land use compatibility measures to reduce any potential impacts and ensure that impacts remain less than significant."

However, the EIR has not provided any meaningful evidence or analysis to support the claim that the impacts are less than significant. Notably, the Fresno County Airport Land Use Commission (FC ALUC) review document is not included as an attachment for public review in compliance with CEQA's requirements for meaningful disclosure. Incorporation by reference (CEQA § 15150 (f)) is not appropriate as the FC ALUC review document contributes directly to analysis of the problem at hand. The EIR must be revised to include the FC ALUC review document for review, analysis, and comment by the public and decision makers.

Additionally, based on the August 7, 2023 FC ALUC meeting agenda[16], attachments[17]/[18], and minutes[19] of the meeting, the FC ALUC only reviewed the SEDA Specific Plan. The FC ALUC did not explicitly review or take action on all aspects of the project, including the required General Plan Amendment and Development Code Change required to implement the proposed project. The California Airport Land Use Planning Handbook[20] states that Airport Land Use Commission review is required "Prior to the amendment of a general plan or specific plan, or the adoption of a zoning ordinance or building regulation within the ALUCP planning boundary, the ALUC shall review the plan, ordinance, or regulation for consistency with the ALUCP (PUC Section 21676(b))." Given that the proposed project includes General Plan Amendment and Development Code Change to proceed, FC ALUC review of all associated actions is required. As stated above in the Project Description analysis, the EIR has not provided the new text or exhibits to be included in the revised General Plan associated with the 10 new land use designations created by the proposed project, or the new text of the development code. Therefore, the FC ALUC has not reviewed the required General Plan Amendment and a revised EIR must be prepared to include a finding of significance.

7
CONT

[16] August 7, 2023 FC ALUC meeting agenda https://agendas2011-24.fresnocog.org/agenda/read/785
[17] August 7, 2023 FC ALUC attachment for SEDA project https://agendas2011-24.fresnocog.org/itemAttachments/785/SEDA_-_ALUC_Submittal_-_7.24_.23_.pdf
[18] August 7, 2023 FC ALUC attachment for SEDA project https://agendas2011-24.fresnocog.org/itemAttachments/785/SEDA_-_FAT_Influence_Areas.pdf
[19] August 7, 2023 FC ALUC meeting minutes https://agendas2011-24.fresnocog.org/itemAttachments/794/080723_ALUC_Action_Summary.pdf
[20] California Airport Land Use Planning Handbook https://dot.ca.gov/-/media/dot-media/programs/aeronautics/documents/californiaairportlanduseplanninghandbook-a11y.pdf

3.11 Land Use and Planning

It must be noted that the EIR does not accurately characterize or analyze the permitted use types within each land use designation of the SEDA SP[21]. For example, SEDA SP Policy EO-2.1 states, "Promote industry clusters that build on Fresno's local strengths. The SEDA Plan presents opportunities for each of the following clusters: Advanced Manufacturing, Clean Energy, Construction, Food Processing, Healthcare, Information Processing, **Logistics & Distribution**, Software Development, Tourism, and Water Technology. This list may evolve as Fresno grows and changes." The EIR does not discuss or analyze the possibility of logistics and distribution uses in any of the proposed land use designations. The EIR is inadequate as an informational document and must be revised to accurately list all permitted/conditionally permitted uses within each land use designation and update all associated impact analysis.

The EIR is not clear regarding the proposed General Plan land use designations for the project site. Specifically, the EIR only provides exhibits that depict the Existing General Plan land use designations and the proposed SEDA SP land use designations, leaving the reader to assume that the proposed SEDA land uses *are* the new General Plan land use designations. It must be noted that the City's General Plan does not list any of the 10 proposed SEDA land use designations as existing land use designations. For example, SEDA's employment-focused land use designations are "Office Center" and "Flexible Research and Development." These land use designations do not exist in the City's General Plan, and neither do any of the other eight proposed land use designations. The City's General Plan also does not include a broad "Specific Plan" land use designation that would be applied to all parcels within any approved Specific Plan within the City. Therefore, all 10 land use designations proposed in the SEDA SP will be new additions to the General Plan and the EIR must be revised to include all text and exhibits that will be part of the revised General Plan and Development Code in order to comply with CEQA's requirements for meaningful disclosure and adequate informational documents (CEQA § 15121). 8

Additionally, the EIR does not provide adequate information to determine the project's compliance or noncompliance with statutory requirements of the Housing Crisis Act (HCA) of 2019/Senate Bill (SB) 330[22]/SB 8[23]. The HCA/SB 330/SB 8 require replacement housing sites when land designated for housing development experience land use changes to ensure no net loss of housing capacity. 9

[21] SEDA SP https://www.fresno.gov/wp-content/uploads/2023/07/Draft-SEDA-Specific-Plan.pdf
[22] Housing Crisis Act of 2019/SB 330 https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200SB330
[23] SB 8 https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB8

Government Code Section 66300(b)(1)(A) requires that agencies shall not "change the general plan land use designation, specific plan land use designation, or zoning to a less intensive use below what was allowed under the land use designation and zoning ordinances in effect at the time of the proposed change." Under Government Code Section 66300(b)(1)(A), a "less intensive use" includes, but is not limited to, reductions to height, density, or floor area ratio, new or increased open space or lot size requirements, or new or increased setback requirements, minimum frontage requirements, or maximum lot coverage limitations, or any other action that would individually or cumulatively reduce residential development capacity. Pursuant to SB 330, replacement capacity for any displaced residential units must be provided **concurrently** at the **time of project approval**. 9 CONT

Government Code Section 66300 (h)(i)(1) states that, "this section does not prohibit an affected county or an affected city, including the local electorate acting through the initiative process, from changing a land use designation or zoning ordinance to a less intensive use, or reducing the intensity of land use, if the city or county concurrently changes the development standards, policies, and conditions applicable to other parcels within the jurisdiction to ensure that there is no net loss in residential capacity." The EIR is inadequate in that it does not provide the acreage of each existing General Plan land use designation within the project area. The total acreage for each existing General Plan land use designation is necessary to calculate the existing total residential development capacity to ensure there is no net loss of capacity. The EIR must be revised to include this information for analysis. 10

3.14 Population and Housing

The EIR states that, "According to General Plan Tables 1-3 (Residential Development Capacity at General Plan Horizon) and 1-4 (Residential Development Capacity at General Plan Buildout, the proposed project would generate up to 14,900 dwelling units at General Plan Horizon and an additional 25,000 at buildout occurring sometime after 2050, for a total of 45,000 new dwelling units, comprising approximately 31 percent of the total planned capacity for the City. Buildout of the proposed project is considered planned growth and would provide housing to meet the demand for new residential units." However, this statement does not accurately reflect General Plan Tables 1-3 and 1-4. According to the General Plan, the project site is located within Development Areas (DA) DA-3 Southeast and DA-4 East. General Plan Tables 1-3 and 1-4 provide the following buildout information for DA-3 and DA-4: 11

Table 1-3: Residential Development Capacity Under General Plan Horizon (2035)
DA-3 Southeast
Type of Dwelling Unit (DU)
Multi-Family/Townhouse: 2,500 DU
SFD: 3,500 DU

Total: 6,000 DU
Location
City Limits: 0
Development on Sites in Growth Areas Requiring Annexation: 6,000 DU

DA-4 East
Type of DU
MF/Townhouse: 5,100 DU
SFD: 3,800 DU
Location
City Limits: 0
Development on Sites in Growth Areas Requiring Annexation: 8,900 DU
Total General Plan Horizon (2035) = 14,900 DU

Table 1-4: Residential Development Capacity Under Buildout (2056)
DA-3 Southeast
Location
City Limits: 0
Development on Sites in Growth Areas Requiring Annexation: 9,092 DU

DA-4 East
Location
City Limits: 0
Development on Sites in Growth Areas Requiring Annexation: 35,008 DU

Total General Plan Buildout (2056) = 44,100 DU

11
CONT

The EIR states that the General Plan provides for, "up to 14,900 dwelling units at General Plan Horizon and an additional 25,000 at buildout occurring sometime after 2050, for a total of 45,000 new dwelling units." However, the sum of 14,900 DU and 25,000 DU is 39,900 DU, which is 5,100 DU fewer than the proposed project. It must be noted that the General Plan excludes the specific date of total buildout, but the 2019 EIR for the General Plan Update[24] clearly identifies the total buildout year as 2056.

As shown above, the General Plan accommodates a cumulative total of 44,100 DU on the project site from General Plan adoption through 2056. This is 900 DU fewer than the 45,000 DU proposed by the project. The proposed project exceeds the cumulative General Plan buildout scenario through 2056 and the EIR must be revised to disclose this with a finding of significance.

[24] https://www.fresno.gov/wp-content/uploads/2023/03/Fresno-GP-Public-Review-Draft-Program-EIR.pdf

A revised EIR must also provide a cumulative analysis of projects approved and "in the pipeline" to provide an adequate and accurate analysis to determine if the project will exceed Fresno COG's employment and population growth forecasts, and all projects approved since 2014 and projects "in the pipeline" to provide an adequate and accurate analysis to determine if the project will exceed the City's General Plan employment and population growth forecasts. For example, the General Plan includes Table 1-5: Population Estimate Under Horizon and Buildout that depicts the City will add 226,000 residents by horizon year 2035 and a cumulative total of 425,000 residents by General Plan buildout in 2056. The EIR's estimated 134,550 residents accounts for 59.5% of horizon population buildout (2035), 31.6% of total General Plan population buildout (2056), and 67.5% of the population increase from 2035 to 2056. This is a significant amount of growth attributable to a single project. The EIR has not prepared an adequate cumulative analysis to determine the City's progress towards these buildout scenarios and a revised EIR must be prepared with this information in order to provide an adequate and accurate environmental analysis.

12

The EIR states that, "new development would be required to address potential environmental impacts as part of individual project review. As such, cumulative development would not induce substantial unplanned population growth, either directly or indirectly. Because cumulative projects would comply with all applicable land use plans to provide adequate development within a jurisdiction, cumulative impacts would be less than significant." This statement is misleading and erroneous as CEQA provides several options to exempt future projects from environmental review. New development would not be required to address potential environmental impacts as part of individual project review. New residential development proposed pursuant to the SEDA SP is statutorily exempt from CEQA due to the adoption of a Program EIR. Specifically, CEQA Guidelines Section 15168 (c)(2) states regarding later activities that, "If the agency finds that pursuant to Section 15162, no subsequent EIR would be required, the agency can approve the activity as being within the scope of the project covered by the program EIR, and no new environmental document would be required." CEQA Guidelines Section 15182 exempts "residential, commercial and mixed-use projects that are consistent with a specific plan." CEQA Guidelines Section 15182 (c) exempts residential projects so long as no new information has been presented pursuant to Section 15162. Additionally, CEQA Guidelines Section 15168 (b)(2) provides a list of advantages for developing a Program EIR as, "Ensure consideration of cumulative impacts that might be slighted in a case-by-case analysis." Therefore, the EIR's reliance upon delayed/future CEQA review as part of individual project review is not adequate or accurate and does not support a less than significant finding. The EIR must be revised to remove these statements and provide a finding of significance.

3.17 Transportation and Traffic

The EIR has not provided any consistency analysis with the Fresno Council of Governments (COG) 2022 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)[25]. Due to errors in modeling, modeling without supporting evidence, and the EIR's conclusion the project will result in significant and unavoidable cumulatively considerable impacts to Air Quality, the proposed project has signifiant potential for inconsistency with Goal 2: Vibrant communities that are accessible by sustainable transportation options, Policy 4: Encourage alternatives to single-occupancy vehicles that reduce vehicle miles traveled (VMT) and greenhouse gas emissions, and Policy 6: Encourage sustainable development that focuses growth near activity centers and mobility options that achieve greater location efficiency. Portions of the project site is also identified as an Environmental Justice area[26] in Fresno COG's 2022 RTP/SCS. Since the project requires a General Plan Amendment to the land use designations on the project site to proceed, it was clearly not accounted for or analyzed by the 2022 RTP/SCS. A revised EIR must be prepared to accurately analyze and disclose the inconsistency with the 2022 RTP/SCS document with a finding of significance. 13

Further, the EIR impact analysis relies on the notion that bus rapid transit (BRT) service will be expanded in Fresno to serve the project area (Kings Canyon), rendering several impact areas less than significant. However, the EIR does not provide any meaningful evidence to support the conclusion that the BRT expansion will actually be constructed. Most notably, the Fresno COG Long Range Transportation Plan[27] (LRTP) (2019-2050) does not include service to the SEDA SP area as a specific project. Table 2 - LRTP Project List within the LRTP only includes, "Project 6: Extend the Kings Canyon BRT corridor to Fancher Creek," and the Fancher Creek area is located north/west of the SEDA areas and not contiguous to it. Therefore, BRT service to the project area is not a funded commitment or project and is not planned to exist by 2050. The EIR must be revised to clarify this and update its impact analysis throughout the document. 14

4.2 Growth-Inducing Impacts

The EIR has excluded for discussion for the precedence setting action that approval of the required General Plan Amendment and Development Code Change set for future changes in the City. The EIR must be revised to include a finding of significance as the required GPA/Development Code Change to implement the project will result in significant and unavoidable cumulatively 15

[25] Fresno COG 2022 RTP/SCS https://www.planfresno.com/sustainable-communities-strategies-fall-outreach/
[26] Environmental Justice Chapter of 2022 Fresno COG RTP/SCS https://www.planfresno.com/planfresno/uploads/2022/06/Chapter-7-Environmental-Justice-Final-Draft.pdf
[27] https://www.fresnocog.org/wp-content/uploads/2021/10/Fresno-County-Regional-Long-Range-Transit-Plan-050519-RL-34.pdf

considerable impacts to Aesthetics, Agricultural Resources, Air Quality, and Noise, and approval of the proposed project will set precedent for approval of other projects with significant and unavoidable impacts that require changes in land use designations and will encourage and facilitate other activities that will have significant negative impacts to the environment. The EIR must be revised to disclose this information and provide a finding of significance.

The EIR has excluded discussion of the precedence setting action that approval of the required General Plan Amendment and Development Code Change set for future changes in the City. The EIR does not analyze that the project will create 10 new General Plan land use designations that can be applied to any property in the City. The EIR must be revised to disclose this information and provide a finding of significance.

The EIR states that, "According to General Plan Tables 1-3 (Residential Development Capacity at General Plan Horizon) and 1-4 (Residential Development Capacity at General Plan Buildout, the proposed project would generate up to 14,900 dwelling units at General Plan Horizon and an additional 25,000 at buildout occurring sometime after 2050, for a total of 45,000 new dwelling units, comprising approximately 31 percent of the total planned capacity for the City. Buildout of the proposed project is considered planned growth and would provide housing to meet the demand for new residential units." However, this statement does not accurately reflect General Plan Tables 1-3 and 1-4. According to the General Plan, the project site is located within Development Areas (DA) DA-3 Southeast and DA-4 East. General Plan Tables 1-3 and 1-4 provide the following buildout information for DA-3 and DA-4: 15 CONT

Table 1-3: Residential Development Capacity Under General Plan Horizon (2035)
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Type of Dwelling Unit (DU)
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SFD: 3,500 DU
Total: 6,000 DU
Location
City Limits: 0
Development on Sites in Growth Areas Requiring Annexation: 6,000 DU

DA-4 East
Type of DU
MF/Townhouse: 5,100 DU
SFD: 3,800 DU
Location
City Limits: 0
Development on Sites in Growth Areas Requiring Annexation: 8,900 DU

Total General Plan Horizon (2035) = 14,900 DU

Table 1-4: Residential Development Capacity Under Buildout (2056)
DA-3 Southeast
Location
City Limits: 0
Development on Sites in Growth Areas Requiring Annexation: 9,092 DU

DA-4 East
Location
City Limits: 0
Development on Sites in Growth Areas Requiring Annexation: 35,008 DU

Total General Plan Buildout (2056) = 44,100 DU

15 CONT

The EIR states that the General Plan provides for, "up to 14,900 dwelling units at General Plan Horizon and an additional 25,000 at buildout occurring sometime after 2050, for a total of 45,000 new dwelling units." However, the sum of 14,900 DU and 25,000 DU is 39,900 DU, which is 5,100 DU fewer than the proposed project. It must be noted that the General Plan excludes the specific date of total buildout, but the 2019 EIR for the General Plan Update[28] clearly identifies the total buildout year as 2056.

As shown above, the General Plan accommodates a cumulative total of 44,100 DU on the project site from General Plan adoption through 2056. This is 900 DU fewer than the 45,000 DU proposed by the project. The proposed project exceeds the cumulative General Plan buildout scenario through 2056 and the EIR must be revised to disclose this with a finding of significance.
The EIR must also be

A revised EIR must also provide a cumulative analysis of projects approved and "in the pipeline" to provide an adequate and accurate analysis to determine if the project will exceed Fresno COG's employment and population growth forecasts, and all projects approved since 2014 and projects "in the pipeline" to provide an adequate and accurate analysis to determine if the project will exceed the City's General Plan employment and population growth forecasts. For example, the General Plan includes Table 1-5: Population Estimate Under Horizon and Buildout that depicts the City will add 226,000 residents by horizon year 2035 and a cumulative total of 425,000 residents by General Plan buildout in 2056. The EIR's estimated 134,550 residents accounts for 59.5% of horizon population buildout (2035), 31.6% of total General Plan population buildout

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[28] https://www.fresno.gov/wp-content/uploads/2023/03/Fresno-GP-Public-Review-Draft-Program-EIR.pdf

(2056), and 67.5% of the population increase from 2035 to 2056. This is a significant amount of growth attributable to a single project. The EIR has not prepared an adequate cumulative analysis to determine the City's progress towards these buildout scenarios and a revised EIR must be prepared with this information in order to provide an adequate and accurate environmental analysis.

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4.3 Mandatory Findings of Significance

The EIR concludes that the proposed project will have a less than significant impact regarding Mandatory Finding of Significance Threshold 3: "The environmental effects of a project will cause substantial adverse effects on human beings, either directly or indirectly." The EIR states that, "Compliance with and implementation of mitigation measures, existing regulations, and the City's standard permit conditions would ensure that the proposed project, and future development consistent with the proposed project, would not result in substantial adverse effects on human beings, including effects related to air pollution, seismic and geologic hazards, hazardous materials, flooding and natural disasters, or noise and vibration. Therefore, impacts associated with the proposed project would be less than significant."

However, this analysis fails to account for the project's significant and unavoidable cumulatively considerable impact for Threshold AIR-3: Project-level Sensitive Receptors Exposure to Pollutant Concentrations. Regarding this signifiant impact, the EIR states that proposed mitigation would reduce impacts to the extent feasible, but, "the proposed project would result in the future development of numerous projects, each contributing incrementally to air emissions affecting sensitive receptors. Thus, it is possible that the proposed project would result in cumulatively significant impacts to sensitive receptors, even if individual projects were each less than significant. This is particularly likely since none of the measures herein would prevent multiple development projects from being constructed concurrently within close proximity to sensitive receptors in such a manner as to cause substantial concentrations within the area. Further, neither the amount of construction occurring nor the exact location within the Plan Area is foreseeable and, as such, it cannot be determined whether the resultant construction emissions could be adequately controlled or reduced to below regulatory thresholds. Without such information, it is not possible to conclude that air pollutant emissions resulting from construction activities would be adequately reduced to the point that sensitive receptors are not exposed to substantial concentrations of air pollutants, and thus a significant and unavoidable impact may result." The EIR is internally inconsistent as it does not acknowledge this impact in the Mandatory Findings. The EIR must be revised to include this information for analysis and provide a finding of significance.

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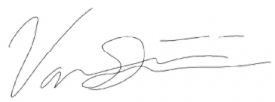
5.0 Alternatives

The EIR is required to evaluate a reasonable range of alternatives to the proposed project which will avoid or substantially lessen any of the significant effects of the project (CEQA § 15126.6.) The alternatives chosen for analysis include the CEQA required "No Project/No Build" alternative and only two others - Consolidated Business Park Alternative and Farmland Conservation Alternative. The EIR does not evaluate a reasonable range of alternatives as only two alternatives beyond the required No Project alternative are analyzed. The EIR does not include an alternative eliminates any of the project's significant and unavoidable impacts. The EIR must be revised to include analysis of a reasonable range of alternatives and foster informed decision making (CEQA § 15126.6). This could include alternatives such as development of the site with a project that eliminates all of the proposed project's significant and unavoidable impacts to less than significant levels while meeting all project objectives. The EIR must be revised to include analysis of a reasonable range of alternatives and foster informed decision making (CEQA § 15126.6). 18

Conclusion

For the foregoing reasons, GSEJA believes the EIR is flawed and a revised EIR must be prepared for the proposed project and circulated for public review. Golden State Environmental Justice Alliance requests to be added to the public interest list regarding any subsequent environmental documents, public notices, public hearings, and notices of determination for this project. Send all communications to Golden State Environmental Justice Alliance P.O. Box 79222 Corona, CA 92877.

Sincerely,



Vashon Simien
Blum, Collins & Ho, LLP

Attachments:

1. SWAPE Technical Analysis

SWAPE Technical Consultation, Data Analysis and Litigation Support for the Environment

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March 18, 2025

Gary Ho
Blum, Collins & Ho LLP
707 Wilshire Blvd, Ste. 4880
Los Angeles, CA 90017

Subject: **Comments on the Fresno Southeast Development Area Specific Plan Project (SCH No. 2022020486)**

19

Dear Mr. Ho,

We have reviewed the February 2025 Recirculated Draft Program Environmental Impact Report ("RDPEIR") for the Fresno Southeast Development Area Specific Plan Project ("Specific Plan") located in the City of Fresno. The Project proposes constructing complete communities and mixed-use centers, including up to 45,000 dwelling units, over a 9,000-acre plan area.

In our opinion, the RDPEIR does not sufficiently evaluate the Project's air quality and greenhouse gas ("GHG") impacts. Emissions associated with construction and operation of the proposed Project may therefore be inadequately addressed. A revised Environmental Impact Report ("EIR") should be prepared to adequately assess and mitigate the potential air quality and greenhouse gas impacts that the project may have on the environment.

Air Quality

Failure to Implement All Feasible Mitigation Measures to Reduce Construction-Related and Operational Criteria Air Pollutant Emissions

The RDPEIR relies on California Emissions Estimator Model ("CalEEMod") to estimate emissions from construction and operation of future projects under the Specific Plan. Despite incorporating Mitigation Measures ("MM") AIR-1a through AIR-1d, the RDPEIR concludes that construction-related and operational emissions of volatile organic compounds ("VOC"), nitrogen oxide ("NO_x"), carbon oxide ("CO"), particulate matter 10 ("PM_{10}"), and particulate matter 2.5 ("$PM_{2.5}$") would remain significant and unavoidable (pp. 3.3-48–51, Table 3.3-8, Table 3.3-9).

The RDPEIR, however, does not implement all feasible mitigation for reducing these emissions. The California Environmental Quality Act ("CEQA") requires lead agencies to implement all feasible mitigation to reduce significant impacts to the maximum extent feasible.[1] The RDPEIR fails to evaluate or adopt additional measures that could further reduce emissions. As outlined in the "Feasible Mitigation Measures Available to Reduce Emissions" section of this letter, we suggest further mitigation measures to be considered; a revised EIR should be prepared to further assess and incorporate all available mitigation before concluding that impacts are significant and unavoidable.

Greenhouse Gas

Failure to Implement All Feasible Mitigation Measures to Reduce Greenhouse Gas Impacts

The RDPEIR estimates that Project construction and operation would generate 2,316,578 and 510,791 metric tons of carbon dioxide equivalents per year ("MT CO_2e/year"), respectively (p. 3.8-42–43, Table 3.8-2, 2.8-3). The RDPEIR concludes that the Project's GHG emissions would be less than significant based on consistency with the 2022 ARB Scoping Plan and the Fresno 2022 Regional Transportation Plant ("RTP") and the Sustainable Communities Strategy ("SCS") (p. 3.8-56).

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CONT

In our opinion, however, the RDPEIR's significant and unavoidable conclusion lacks sufficient support. CEQA requires the RDPEIR to implement all feasible mitigation to minimize impacts to the maximum extent feasible.[2] An impact can only be deemed significant and unavoidable after considering all available feasible mitigation. The RDPEIR does not incorporate all feasible mitigation measures despite declaring compliance with the RTP and SCS plans.

A revised EIR should be prepared to include and provide evidence for the implementation of additional feasible mitigation measures which we recommend below in the section titled, "Feasible Mitigation Measures Available to Reduce Emissions."

Mitigation

Feasible Mitigation Measures Available to Reduce Emissions

The RDPEIR concludes that the construction and operation of future projects under the Specific Plan would lead to significant air quality and GHG impacts. Under CEQA, the RDPEIR is required to implement all feasible mitigation. We have provided a list of additional mitigation measures below for the Project Applicant to consider implementing as formal mitigation measures in a future EIR.

[1] "Guidance on Frequently Questioned Topics in Roadway Analysis for the California Environmental Quality Act (CEQA)." CEQA, February 2018, *available at*: https://www.aqmd.gov/docs/default-source/ceqa/handbook/roadway-ceqa-guidance_v10.pdf, p. 2.
[2] *Ibid*.

To reduce the VOC emissions associated with the construction and operation of future projects, we recommend the RDPEIR consider incorporating the following mitigation measures used by other land use development projects to address VOC emissions: [3]

- Recycle leftover paint. Take any leftover paint to a household hazardous waste center; do not mix leftover water-based and oil-based paints.
- Keep lids closed on all paint containers when not in use to prevent VOC emissions and excessive odors.
- For water-based paints, clean up with water only. Whenever possible, do not rinse the cleanup water down the drain or pour it directly into the ground or the storm drain
- Use compliant low-VOC cleaning solvents to clean paint application equipment.
- Keep all paint- and solvent-laden rags in sealed containers to prevent VOC emissions.

The United States Environmental Protection Agency recommends conducting calculations for coverage area and thinning ratios prior to purchasing paints. By applying these calculations, the appropriate quantity of paint can be acquired, helping to minimize waste and optimize resource use.[4]

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To reduce construction VOC emissions, the California Department of Public Health ("CDPH") recommends the use of:[5]

- Composite wood products that comply with the California Air Resources Board's ("CARB") Airborne Toxic Control Measure for formaldehyde.
- Interior paints, coatings, adhesives, and sealants that comply with South Coast AQMD Rule 1168 or CARB's Suggested Control Measure for Architectural Coatings.
- Flooring materials that are certified as low emitting under the CDPH Standard Method v1.2 or equivalent.
- Sealer on the surface of spray-on fireproofing to reduce adsorption of VOCs using a low-VOC sealer, if necessary.

An additional mitigation measure that may reduce the impact from operational VOC emissions is to implement a mechanical ventilation system meeting the American Society of Heating, Refrigerating and Air-Conditioning Engineers Standards 62.1 and 62.2. [6] HVAC systems should include MERV 13 or higher filters to reduce indoor pollutant exposure. Prior to occupancy, the building should undergo a flush-out

[3] "Banning Commerce Center Project." Kimley-Horn and Associates, Inc., June 2024, *available at*: https://ceqanet.opr.ca.gov/2022090102/2; Draft Environmental Impact Report, p. 1-7.
[4] "Methods for Estimating Air Emissions from Paint, Ink, and Other Coating Manufacturing Facilities." Emissions Inventory Improvement Program, February 2005, *available at*: https://www.epa.gov/sites/default/files/2015-08/documents/ii08_feb2005.pdf, Volume II, Chapter 8, p. 8.3-1.
[5] "Reducing occupant exposure to volatile organic compounds (VOCs) from indoor sources: Guidelines for building occupants." California Department of Public Health, July 1996, *available at*: https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/CDPH%20Document%20Library/reducing_occupant_exposure_vocs_guidelines_ADA.pdf.
[6] *Ibid.*, p. xii.

period with HVAC systems operating at full capacity for at least 48 hours to remove residual VOCs and improve indoor air quality.

To reduce the NO_x, PM_{10}, and $PM_{2.5}$ emissions from the construction and operation of future project, which commonly originate from mobile source engines and road dust, we recommend the DPEIR consider incorporating several mitigation measures (see list below).[7,8]

The Southern California Association of Governments ("SCAG")'s 2020 *RTP/SCS* Program Environmental Impact Report recommends the following Air Quality Project Level Mitigation Measures, which are applicable to future projects: [9]

- Minimize land disturbance.
- Cover trucks when hauling dirt.
- Limit vehicular paths on unpaved surfaces and stabilize any temporary roads.
- Minimize unnecessary vehicular and machinery activities.
- Provide an operational water truck on-site at all times. Use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas. Sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway.
- Develop a traffic plan to minimize community impacts as a result of traffic flow interference from construction activities. The plan may include advance public notice of routing, use of public transportation, and satellite parking areas with a shuttle service. Schedule operations affecting traffic for off-peak hours. Minimize obstruction of through-traffic lanes. Provide a flag person to guide traffic properly and ensure safety at construction sites. Project sponsors should consider developing a goal for the minimization of community impacts.
- Require contractors to assemble a comprehensive inventory list (i.e., make, model, engine year, horsepower, emission rates) of all heavy-duty off-road (portable and mobile) equipment (50 horsepower and greater) that could be used an aggregate of 40 or more hours for the construction project.
- Require residential area parking permit.

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To reduce the CO emissions associated with the construction and operation of future projects under the Specific Plan, the Bay Area Air Quality Management District recommends implementing "reduction programs to reduce vehicle miles traveled ("VMT"), improving bicycle and pedestrian infrastructure and access; improving public transit service and access; designating truck routes and limiting heavy-duty

[7] "Proposed Revisions to the National Ambient Air Quality Standards for Nitrogen Dioxide." EPA, July 2009, *available at*: https://www.gpo.gov/fdsys/pkg/FR-2009-07-15/pdf/E9-15944.pdf.
[8] "Particle Pollution and your Health." EPA, September 2003, *available at*: https://www.airnow.gov/publications/air-quality-andyour-health/partical-pollution-and-your-health/.
[9] "4.0 Mitigation Measures." Connect SoCal Program Environmental Impact Report Addendum #1, September 2020, available at: https://scag.ca.gov/sites/main/files/file-attachments/fpeir_connectsocal_addendum_4_mitigationmeasures.pdf?1606004420, p. 4.0-2 – 4.0-10; 4.0-19 – 4.0-23; See also: "Certified Final Connect SoCal Program Environmental Impact Report." SCAG, May 2020, *available at:* https://scag.ca.gov/peir.

truck traffic during peak hours, and encouraging the use of cleaner fuel vehicles."[10] We recommend the following mitigation measures used by other land use development projects:

- All construction equipment shall be properly tuned and maintained in accordance with manufacturer specifications.
- The use of electrical or natural-gas-powered construction equipment shall be employed where feasible, including forklifts and other comparable equipment types.

To reduce the GHG emissions associated with future projects, we suggest several mitigation measures (see list below).

The SCAG's 2020 RTP/SCS Program Environmental Impact Report Greenhouse Gas Project Level Mitigation Measures recommends:

- Incorporate bicycle and pedestrian facilities into project designs, maintaining these facilities, and providing amenities incentivizing their use; and planning for and building local bicycle projects that connect with the regional network.
- Improving transit access to rail and bus routes by incentives for construction and transit facilities within developments, and/or providing dedicated shuttle service to transit stations.
- Designate a percentage of parking spaces for ride-sharing vehicles or high-occupancy vehicles, and provide adequate passenger loading and unloading for those vehicles.

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In their 2022 Scoping Plan, CARB recommends that new residential projects "[use] all-electric appliances without any natural gas connections and [do] not use propane or other fossil fuels for space heating, water heating, or indoor cooking" in order to reduce Project-related GHG emissions. [11]

CEQA Guidelines 15126.4 (c)(3) include "[o]ffsite measures, including offsets that are not otherwise required, to mitigate a project's emissions" as viable options for GHG mitigation.[12] While the use of local carbon offset programs to reduce a project's GHG impacts should be considered as a measure of last resort, around 5% of project have implemented such strategies to mitigate residual emissions.[13] There are many instances of projects implementing similar strategies, one example is the Otay Ranch Village

[10] "Mitigating Air Quality and Climate Impacts." BAAQMD, 2022, *available at:* https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/ceqa-guidelines-chapter-8-mitigation_final-pdf.pdf?rev=5a4aa8d31c394498b8b4de4e9eb46edc, p. 8-2 and 3.
[11] "2022 Scoping Plan For Achieving Carbon Neutrality" CARB, November 2022, *available at*: https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-d-local-actions.pdf, Appendix D, p. 23, Table 3.
[12] "Cal. Code Regs. tit. 14 § 15126.4." CEQA Guidelines, May 2024, *available at*: https://casetext.com/regulation/california-code-of-regulations/title-14-natural-resources/division-6-resources-agency/chapter-3-guidelines-for-implementation-of-the-california-environmental-quality-act/article-9-contents-of-environmental-impact-reports/section-151264-consideration-and-discussion-of-mitigation-measures-proposed-to-minimize-significant-effects.
[13] "Local CEQA Mitigation Best Practices and Lessons Learned." CARB and California EPA, September 2023, *available at*: https://ww2.arb.ca.gov/sites/default/files/2023-11/CARB%2021STC001%20White%20Paper.pdf, p. ix, 46.

13 Project in San Diego County which proposed the use of carbon offsets to mitigate its GHG emissions.[14] Another example of this was in the case of the Oakland Sports and Mixed-Use Project, where off-site reduction measures in the neighboring communities were recommended.[15]

The California Air Pollution Control Officers Association recommends the establishment of community gardens as a method of mitigation for greenhouse gas.[16] Community gardens can provide local food sources, potentially reducing VMT for grocery shopping and displacing carbon-intensive food production practices. The reduced VMT could minimize CO, NO_x, PM_{10}, and $PM_{2.5}$ emissions from the operations of future projects under the Specific Plan.

The measures provided offer feasible ways to incorporate lower-emitting design features into the proposed Project, which can subsequently reduce emissions released during the construction and operation of the future projects.

We recommend a revised EIR be prepared to include all feasible mitigation measures, as well as updated air quality and GHG analyses to ensure that the necessary mitigation measures are implemented. The revised EIR should also demonstrate a commitment to the implementation of these measures prior to Specific Plan approval to ensure that the potentially significant emissions from future projects are reduced to the maximum extent possible. 19 CONT

Disclaimer

SWAPE has received limited documentation regarding this project. Additional information may become available in the future; thus, we retain the right to revise or amend this report when additional information becomes available. Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable environmental consultants practicing in this or similar localities at the time of service. No other warranty, expressed or implied, is made as to the scope of work, work methodologies and protocols, site conditions, analytical testing results, and findings presented. This report reflects efforts which were limited to information that was reasonably accessible at the time of the work, and may contain informational gaps, inconsistencies, or otherwise be incomplete due to the unavailability or uncertainty of information obtained or provided by third parties.

[14] "List Of Mitigation Measures and Environmental Design Considerations." Otay Ranch Resort Village FEIR, County of San Diego, September 2020, *available at*: https://www.sandiegocounty.gov/content/dam/sdc/pds/ceqa/OtayRanchVillage13Resort/PreBoard/DFEIR/7.0%20List%20of%20Mitigation%20Measures%20.pdf, Chapter 7.0, p. 7-50.

[15] "Cal. Pub. Resources Code § 21168.6.7." 2024, *available at*: https://casetext.com/statute/california-codes/california-public-resources-code/division-13-environmental-quality/chapter-6-limitations/section-2116867-oakland-sports-and-mixed-use-project-conditions-for-approval-certification-of-project-for-streamlining.

[16] "Quantifying Greenhouse Gas Mitigation Measures." CAPCOA, August 2010, *available at:* https://www.aqmd.gov/docs/default-source/ceqa/handbook/capcoa-quantifying-greenhouse-gas-mitigation-measures.pdf, p. 448.

Sincerely,

Matt Hagemann, P.G., C.Hg.

Paul E. Rosenfeld, Ph.D.

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Attachment A: Matt Hagemann CV
Attachment B: Paul Rosenfeld CV

SWAPE Technical Consultation, Data Analysis and Litigation Support for the Environment

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Matthew F. Hagemann, P.G., C.Hg., QSD, QSP

Geologic and Hydrogeologic Characterization
Investigation and Remediation Strategies
Litigation Support and Testifying Expert
Industrial Stormwater Compliance
CEQA Review

Education:

M.S. Degree, Geology, California State University Los Angeles, Los Angeles, CA, 1984.
B.A. Degree, Geology, Humboldt State University, Arcata, CA, 1982.

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Professional Certifications:

California Professional Geologist
California Certified Hydrogeologist
Qualified SWPPP Developer and Practitioner

Professional Experience:

Matt has 30 years of experience in environmental policy, contaminant assessment and remediation, stormwater compliance, and CEQA review. He spent nine years with the U.S. EPA in the RCRA and Superfund programs and served as EPA's Senior Science Policy Advisor in the Western Regional Office where he identified emerging threats to groundwater from perchlorate and MTBE. While with EPA, Matt also served as a Senior Hydrogeologist in the oversight of the assessment of seven major military facilities undergoing base closure. He led numerous enforcement actions under provisions of the Resource Conservation and Recovery Act (RCRA) and directed efforts to improve hydrogeologic characterization and water quality monitoring. For the past 15 years, as a founding partner with SWAPE, Matt has developed extensive client relationships and has managed complex projects that include consultation as an expert witness and a regulatory specialist, and a manager of projects ranging from industrial stormwater compliance to CEQA review of impacts from hazardous waste, air quality and greenhouse gas emissions.

Positions Matt has held include:

- Founding Partner, Soil/Water/Air Protection Enterprise (SWAPE) (2003 – present);
- Geology Instructor, Golden West College, 2010 – 2104, 2017;
- Senior Environmental Analyst, Komex H2O Science, Inc. (2000 -- 2003);

- Executive Director, Orange Coast Watch (2001 – 2004);
- Senior Science Policy Advisor and Hydrogeologist, U.S. Environmental Protection Agency (1989–1998);
- Hydrogeologist, National Park Service, Water Resources Division (1998 – 2000);
- Adjunct Faculty Member, San Francisco State University, Department of Geosciences (1993 – 1998);
- Instructor, College of Marin, Department of Science (1990 – 1995);
- Geologist, U.S. Forest Service (1986 – 1998); and
- Geologist, Dames & Moore (1984 – 1986).

Senior Regulatory and Litigation Support Analyst:

With SWAPE, Matt's responsibilities have included:

- Lead analyst and testifying expert in the review of over 300 environmental impact reports and negative declarations since 2003 under CEQA that identify significant issues with regard to hazardous waste, water resources, water quality, air quality, greenhouse gas emissions, and geologic hazards. Make recommendations for additional mitigation measures to lead agencies at the local and county level to include additional characterization of health risks and implementation of protective measures to reduce worker exposure to hazards from toxins and Valley Fever.
- Stormwater analysis, sampling and best management practice evaluation at more than 100 industrial facilities.
- Expert witness on numerous cases including, for example, perfluorooctanoic acid (PFOA) contamination of groundwater, MTBE litigation, air toxins at hazards at a school, CERCLA compliance in assessment and remediation, and industrial stormwater contamination.
- Technical assistance and litigation support for vapor intrusion concerns.
- Lead analyst and testifying expert in the review of environmental issues in license applications for large solar power plants before the California Energy Commission.
- Manager of a project to evaluate numerous formerly used military sites in the western U.S.
- Manager of a comprehensive evaluation of potential sources of perchlorate contamination in Southern California drinking water wells.
- Manager and designated expert for litigation support under provisions of Proposition 65 in the review of releases of gasoline to sources drinking water at major refineries and hundreds of gas stations throughout California.

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With Komex H2O Science Inc., Matt's duties included the following:

- Senior author of a report on the extent of perchlorate contamination that was used in testimony by the former U.S. EPA Administrator and General Counsel.
- Senior researcher in the development of a comprehensive, electronically interactive chronology of MTBE use, research, and regulation.
- Senior researcher in the development of a comprehensive, electronically interactive chronology of perchlorate use, research, and regulation.
- Senior researcher in a study that estimates nationwide costs for MTBE remediation and drinking water treatment, results of which were published in newspapers nationwide and in testimony against provisions of an energy bill that would limit liability for oil companies.
- Research to support litigation to restore drinking water supplies that have been contaminated by MTBE in California and New York.

- Expert witness testimony in a case of oil production-related contamination in Mississippi.
- Lead author for a multi-volume remedial investigation report for an operating school in Los Angeles that met strict regulatory requirements and rigorous deadlines.
- Development of strategic approaches for cleanup of contaminated sites in consultation with clients and regulators.

Executive Director:

As Executive Director with Orange Coast Watch, Matt led efforts to restore water quality at Orange County beaches from multiple sources of contamination including urban runoff and the discharge of wastewater. In reporting to a Board of Directors that included representatives from leading Orange County universities and businesses, Matt prepared issue papers in the areas of treatment and disinfection of wastewater and control of the discharge of grease to sewer systems. Matt actively participated in the development of countywide water quality permits for the control of urban runoff and permits for the discharge of wastewater. Matt worked with other nonprofits to protect and restore water quality, including Surfrider, Natural Resources Defense Council and Orange County CoastKeeper as well as with business institutions including the Orange County Business Council.

Hydrogeology:

As a Senior Hydrogeologist with the U.S. Environmental Protection Agency, Matt led investigations to characterize and cleanup closing military bases, including Mare Island Naval Shipyard, Hunters Point Naval Shipyard, Treasure Island Naval Station, Alameda Naval Station, Moffett Field, Mather Army Airfield, and Sacramento Army Depot. Specific activities were as follows:

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- Led efforts to model groundwater flow and contaminant transport, ensured adequacy of monitoring networks, and assessed cleanup alternatives for contaminated sediment, soil, and groundwater.
- Initiated a regional program for evaluation of groundwater sampling practices and laboratory analysis at military bases.
- Identified emerging issues, wrote technical guidance, and assisted in policy and regulation development through work on four national U.S. EPA workgroups, including the Superfund Groundwater Technical Forum and the Federal Facilities Forum.

At the request of the State of Hawaii, Matt developed a methodology to determine the vulnerability of groundwater to contamination on the islands of Maui and Oahu. He used analytical models and a GIS to show zones of vulnerability, and the results were adopted and published by the State of Hawaii and County of Maui.

As a hydrogeologist with the EPA Groundwater Protection Section, Matt worked with provisions of the Safe Drinking Water Act and NEPA to prevent drinking water contamination. Specific activities included the following:

- Received an EPA Bronze Medal for his contribution to the development of national guidance for the protection of drinking water.
- Managed the Sole Source Aquifer Program and protected the drinking water of two communities through designation under the Safe Drinking Water Act. He prepared geologic reports, conducted

public hearings, and responded to public comments from residents who were very concerned about the impact of designation.

- Reviewed a number of Environmental Impact Statements for planned major developments, including large hazardous and solid waste disposal facilities, mine reclamation, and water transfer.

Matt served as a hydrogeologist with the RCRA Hazardous Waste program. Duties were as follows:

- Supervised the hydrogeologic investigation of hazardous waste sites to determine compliance with Subtitle C requirements.
- Reviewed and wrote "part B" permits for the disposal of hazardous waste.
- Conducted RCRA Corrective Action investigations of waste sites and led inspections that formed the basis for significant enforcement actions that were developed in close coordination with U.S. EPA legal counsel.
- Wrote contract specifications and supervised contractor's investigations of waste sites.

With the National Park Service, Matt directed service-wide investigations of contaminant sources to prevent degradation of water quality, including the following tasks:

- Applied pertinent laws and regulations including CERCLA, RCRA, NEPA, NRDA, and the Clean Water Act to control military, mining, and landfill contaminants.
- Conducted watershed-scale investigations of contaminants at parks, including Yellowstone and Olympic National Park.
- Identified high-levels of perchlorate in soil adjacent to a national park in New Mexico and advised park superintendent on appropriate response actions under CERCLA.
- Served as a Park Service representative on the Interagency Perchlorate Steering Committee, a national workgroup.
- Developed a program to conduct environmental compliance audits of all National Parks while serving on a national workgroup.
- Co-authored two papers on the potential for water contamination from the operation of personal watercraft and snowmobiles, these papers serving as the basis for the development of nation-wide policy on the use of these vehicles in National Parks.
- Contributed to the Federal Multi-Agency Source Water Agreement under the Clean Water Action Plan.

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Policy:

Served senior management as the Senior Science Policy Advisor with the U.S. Environmental Protection Agency, Region 9.

Activities included the following:

- Advised the Regional Administrator and senior management on emerging issues such as the potential for the gasoline additive MTBE and ammonium perchlorate to contaminate drinking water supplies.
- Shaped EPA's national response to these threats by serving on workgroups and by contributing to guidance, including the Office of Research and Development publication, Oxygenates in Water: Critical Information and Research Needs.
- Improved the technical training of EPA's scientific and engineering staff.
- Earned an EPA Bronze Medal for representing the region's 300 scientists and engineers in negotiations with the Administrator and senior management to better integrate scientific

principles into the policy-making process.
- Established national protocol for the peer review of scientific documents.

Geology:

With the U.S. Forest Service, Matt led investigations to determine hillslope stability of areas proposed for timber harvest in the central Oregon Coast Range. Specific activities were as follows:

- Mapped geology in the field, and used aerial photographic interpretation and mathematical models to determine slope stability.
- Coordinated his research with community members who were concerned with natural resource protection.
- Characterized the geology of an aquifer that serves as the sole source of drinking water for the city of Medford, Oregon.

As a consultant with Dames and Moore, Matt led geologic investigations of two contaminated sites (later listed on the Superfund NPL) in the Portland, Oregon, area and a large hazardous waste site in eastern Oregon. Duties included the following:

- Supervised year-long effort for soil and groundwater sampling.
- Conducted aquifer tests.
- Investigated active faults beneath sites proposed for hazardous waste disposal.

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Teaching:

From 1990 to 1998, Matt taught at least one course per semester at the community college and university levels:

- At San Francisco State University, held an adjunct faculty position and taught courses in environmental geology, oceanography (lab and lecture), hydrogeology, and groundwater contamination.
- Served as a committee member for graduate and undergraduate students.
- Taught courses in environmental geology and oceanography at the College of Marin.

Matt is currently a part time geology instructor at Golden West College in Huntington Beach, California where he taught from 2010 to 2014 and in 2017.

Invited Testimony, Reports, Papers and Presentations:

Hagemann, M.F., 2008. Disclosure of Hazardous Waste Issues under CEQA. Presentation to the Public Environmental Law Conference, Eugene, Oregon.

Hagemann, M.F., 2008. Disclosure of Hazardous Waste Issues under CEQA. Invited presentation to U.S. EPA Region 9, San Francisco, California.

Hagemann, M.F., 2005. Use of Electronic Databases in Environmental Regulation, Policy Making and Public Participation. Brownfields 2005, Denver, Coloradao.

Hagemann, M.F., 2004. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in Nevada and the Southwestern U.S. Presentation to a meeting of the American Groundwater Trust, Las Vegas, NV (served on conference organizing committee).

Hagemann, M.F., 2004. Invited testimony to a California Senate committee hearing on air toxins at schools in Southern California, Los Angeles.

Brown, A., Farrow, J., Gray, A. and **Hagemann, M.**, 2004. An Estimate of Costs to Address MTBE Releases from Underground Storage Tanks and the Resulting Impact to Drinking Water Wells. Presentation to the Ground Water and Environmental Law Conference, National Groundwater Association.

Hagemann, M.F., 2004. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in Arizona and the Southwestern U.S. Presentation to a meeting of the American Groundwater Trust, Phoenix, AZ (served on conference organizing committee).

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in the Southwestern U.S. Invited presentation to a special committee meeting of the National Academy of Sciences, Irvine, CA.

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Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River. Invited presentation to a tribal EPA meeting, Pechanga, CA.

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River. Invited presentation to a meeting of tribal repesentatives, Parker, AZ.

Hagemann, M.F., 2003. Impact of Perchlorate on the Colorado River and Associated Drinking Water Supplies. Invited presentation to the Inter-Tribal Meeting, Torres Martinez Tribe.

Hagemann, M.F., 2003. The Emergence of Perchlorate as a Widespread Drinking Water Contaminant. Invited presentation to the U.S. EPA Region 9.

Hagemann, M.F., 2003. A Deductive Approach to the Assessment of Perchlorate Contamination. Invited presentation to the California Assembly Natural Resources Committee.

Hagemann, M.F., 2003. Perchlorate: A Cold War Legacy in Drinking Water. Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. From Tank to Tap: A Chronology of MTBE in Groundwater. Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. A Chronology of MTBE in Groundwater and an Estimate of Costs to Address Impacts to Groundwater. Presentation to the annual meeting of the Society of Environmental Journalists.

Hagemann, M.F., 2002. An Estimate of the Cost to Address MTBE Contamination in Groundwater (and Who Will Pay). Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. An Estimate of Costs to Address MTBE Releases from Underground Storage Tanks and the Resulting Impact to Drinking Water Wells. Presentation to a meeting of the U.S. EPA and State Underground Storage Tank Program managers.

Hagemann, M.F., 2001. From Tank to Tap: A Chronology of MTBE in Groundwater. Unpublished report.

Hagemann, M.F., 2001. Estimated Cleanup Cost for MTBE in Groundwater Used as Drinking Water. Unpublished report.

Hagemann, M.F., 2001. Estimated Costs to Address MTBE Releases from Leaking Underground Storage Tanks. Unpublished report.

Hagemann, M.F., and VanMouwerik, M., 1999. Potential Water Quality Concerns Related to Snowmobile Usage. Water Resources Division, National Park Service, Technical Report.

VanMouwerik, M. and **Hagemann, M.F**. 1999, Water Quality Concerns Related to Personal Watercraft Usage. Water Resources Division, National Park Service, Technical Report.

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Hagemann, M.F., 1999, Is Dilution the Solution to Pollution in National Parks? The George Wright Society Biannual Meeting, Asheville, North Carolina.

Hagemann, M.F., 1997, The Potential for MTBE to Contaminate Groundwater. U.S. EPA Superfund Groundwater Technical Forum Annual Meeting, Las Vegas, Nevada.

Hagemann, M.F., and Gill, M., 1996, Impediments to Intrinsic Remediation, Moffett Field Naval Air Station, Conference on Intrinsic Remediation of Chlorinated Hydrocarbons, Salt Lake City.

Hagemann, M.F., Fukunaga, G.L., 1996, The Vulnerability of Groundwater to Anthropogenic Contaminants on the Island of Maui, Hawaii. Hawaii Water Works Association Annual Meeting, Maui, October 1996.

Hagemann, M. F., Fukanaga, G. L., 1996, Ranking Groundwater Vulnerability in Central Oahu, Hawaii. Proceedings, Geographic Information Systems in Environmental Resources Management, Air and Waste Management Association Publication VIP-61.

Hagemann, M.F., 1994. Groundwater Characterization and Cleanup at Closing Military Bases in California. Proceedings, California Groundwater Resources Association Meeting.

Hagemann, M.F. and Sabol, M.A., 1993. Role of the U.S. EPA in the High Plains States Groundwater Recharge Demonstration Program. Proceedings, Sixth Biennial Symposium on the Artificial Recharge of Groundwater.

Hagemann, M.F., 1993. U.S. EPA Policy on the Technical Impracticability of the Cleanup of DNAPL-contaminated Groundwater. California Groundwater Resources Association Meeting.

Hagemann, M.F., 1992. Dense Nonaqueous Phase Liquid Contamination of Groundwater: An Ounce of Prevention... Proceedings, Association of Engineering Geologists Annual Meeting, v. 35.

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Other Experience:

Selected as subject matter expert for the California Professional Geologist licensing examinations, 2009-2011.

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Paul Rosenfeld, Ph.D.

Chemical Fate and Transport & Air Dispersion Modeling

Principal Environmental Chemist

Risk Assessment & Remediation Specialist

Education

Ph.D. Soil Chemistry, University of Washington, 1999. Dissertation on volatile organic compound filtration.

M.S. Environmental Science, U.C. Berkeley, 1995. Thesis on organic waste economics.

B.A. Environmental Studies, U.C. Santa Barbara, 1991. Focus on wastewater treatment.

Professional Experience

Dr. Rosenfeld has over 25 years of experience conducting environmental investigations and risk assessments for evaluating impacts to human health, property, and ecological receptors. His expertise focuses on the fate and transport of environmental contaminants, human health risk, exposure assessment, and ecological restoration. Dr. Rosenfeld has evaluated and modeled emissions from oil spills, landfills, boilers and incinerators, process stacks, storage tanks, confined animal feeding operations, industrial, military and agricultural sources, unconventional oil drilling operations, and locomotive and construction engines. His project experience ranges from monitoring and modeling of pollution sources to evaluating impacts of pollution on workers at industrial facilities and residents in surrounding communities. Dr. Rosenfeld has also successfully modeled exposure to contaminants distributed by water systems and via vapor intrusion.

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Dr. Rosenfeld has investigated and designed remediation programs and risk assessments for contaminated sites containing lead, heavy metals, mold, bacteria, particulate matter, petroleum hydrocarbons, chlorinated solvents, pesticides, radioactive waste, dioxins and furans, semi- and volatile organic compounds, PCBs, PAHs, creosote, perchlorate, asbestos, per- and poly-fluoroalkyl substances (PFOA/PFOS), unusual polymers, fuel oxygenates (MTBE), among other pollutants. Dr. Rosenfeld also has experience evaluating greenhouse gas emissions from various projects and is an expert on the assessment of odors from industrial and agricultural sites, as well as the evaluation of odor nuisance impacts and technologies for abatement of odorous emissions. As a principal scientist at SWAPE, Dr. Rosenfeld directs air dispersion modeling and exposure assessments. He has served as an expert witness and testified about pollution sources causing nuisance and/or personal injury at sites and has testified as an expert witness on numerous cases involving exposure to soil, water and air contaminants from industrial, railroad, agricultural, and military sources.

Professional History:

Soil Water Air Protection Enterprise (SWAPE); 2003 to present; Principal and Founding Partner
UCLA School of Public Health; 2007 to 2011; Lecturer (Assistant Researcher)
UCLA School of Public Health; 2003 to 2006; Adjunct Professor
UCLA Environmental Science and Engineering Program; 2002-2004; Doctoral Intern Coordinator
UCLA Institute of the Environment, 2001-2002; Research Associate
Komex H_2O Science, 2001 to 2003; Senior Remediation Scientist
National Groundwater Association, 2002-2004; Lecturer
San Diego State University, 1999-2001; Adjunct Professor
Anteon Corp., San Diego, 2000-2001; Remediation Project Manager
Ogden (now Amec), San Diego, 2000-2000; Remediation Project Manager
Bechtel, San Diego, California, 1999 – 2000; Risk Assessor
King County, Seattle, 1996 – 1999; Scientist
James River Corp., Washington, 1995-96; Scientist
Big Creek Lumber, Davenport, California, 1995; Scientist
Plumas Corp., California and USFS, Tahoe 1993-1995; Scientist
Peace Corps and World Wildlife Fund, St. Kitts, West Indies, 1991-1993; Scientist

Publications:

Rosenfeld P. E., Spaeth K., Hallman R., Bressler R., Smith, G., (2022) Cancer Risk and Diesel Exhaust Exposure Among Railroad Workers. *Water Air Soil Pollution.* **233,** 171.

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Remy, L.L., Clay T., Byers, V., **Rosenfeld P. E.** (2019) Hospital, Health, and Community Burden After Oil Refinery Fires, Richmond, California 2007 and 2012. *Environmental Health.* 18:48

Simons, R.A., Seo, Y. **Rosenfeld, P**., (2015) Modeling the Effect of Refinery Emission On Residential Property Value. Journal of Real Estate Research. 27(3):321-342

Chen, J. A, Zapata A. R., Sutherland A. J., Molmen, D.R., Chow, B. S., Wu, L. E., **Rosenfeld, P. E.,** Hesse, R. C., (2012) Sulfur Dioxide and Volatile Organic Compound Exposure To A Community In Texas City Texas Evaluated Using Aermod and Empirical Data. *American Journal of Environmental Science*, 8(6), 622-632.

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Cheremisinoff, N.P., & **Rosenfeld, P.E.** (2011). *Handbook of Pollution Prevention and Cleaner Production: Best Practices in the Agrochemical Industry*, Amsterdam: Elsevier Publishing.

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Feng, L., Wu, C., Tam, L., Sutherland, A.J., Clark, J.J., **Rosenfeld, P.E.** (2010). Dioxin and Furan Blood Lipid and Attic Dust Concentrations in Populations Living Near Four Wood Treatment Facilities in the United States. *Journal of Environmental Health*. 73(6), 34-46.

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Cheremisinoff, N.P., & **Rosenfeld, P.E.** (2009). *Handbook of Pollution Prevention and Cleaner Production: Best Practices in the Petroleum Industry*. Amsterdam: Elsevier Publishing.

Wu, C., Tam, L., Clark, J., **Rosenfeld, P**. (2009). Dioxin and furan blood lipid concentrations in populations living near four wood treatment facilities in the United States. *WIT Transactions on Ecology and the Environment, Air Pollution,* 123 (17), 319-327.

Tam L. K.., Wu C. D., Clark J. J. and **Rosenfeld, P.E.** (2008). A Statistical Analysis Of Attic Dust And Blood Lipid Concentrations Of Tetrachloro-p-Dibenzodioxin (TCDD) Toxicity Equivalency Quotients (TEQ) In Two Populations Near Wood Treatment Facilities. *Organohalogen Compounds*, 70, 002252-002255.

Tam L. K.., Wu C. D., Clark J. J. and **Rosenfeld, P.E.** (2008). Methods For Collect Samples For Assessing Dioxins And Other Environmental Contaminants In Attic Dust: A Review. *Organohalogen Compounds*, 70, 000527-000530.

Hensley, A.R. A. Scott, J. J. J. Clark, **Rosenfeld, P.E.** (2007). Attic Dust and Human Blood Samples Collected near a Former Wood Treatment Facility. *Environmental Research*. 105, 194-197.

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Rosenfeld, P. E., M. Suffet. (2007). The Anatomy Of Odour Wheels For Odours Of Drinking Water, Wastewater, Compost And The Urban Environment. *Water Science & Technology* 55(5), 335-344.

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Rosenfeld, P.E., and Suffet, I.H. (2004). Understanding Odorants Associated With Compost, Biomass Facilities, and the Land Application of Biosolids. *Water Science and Technology*. 49(9), 193-199.

Rosenfeld, P.E., and Suffet I.H. (2004). Control of Compost Odor Using High Carbon Wood Ash, *Water Science and Technology*, 49(9), 171-178.

Rosenfeld, P. E., Grey, M. A., Sellew, P. (2004). Measurement of Biosolids Odor and Odorant Emissions from Windrows, Static Pile and Biofilter. *Water Environment Research*. 76(4), 310-315.

Rosenfeld, P.E., Grey, M and Suffet, M. (2002). Compost Demonstration Project, Sacramento California Using High-Carbon Wood Ash to Control Odor at a Green Materials Composting Facility. *Integrated Waste Management Board Public Affairs Office*, Publications Clearinghouse (MS–6), Sacramento, CA Publication #442-02-008.

Rosenfeld, P.E., and C.L. Henry. (2001). Characterization of odor emissions from three different biosolids. *Water Soil and Air Pollution*. 127(1-4), 173-191.

Rosenfeld, P.E., and Henry C. L., (2000). Wood ash control of odor emissions from biosolids application. *Journal of Environmental Quality.* 29, 1662-1668.

Rosenfeld, P.E., C.L. Henry and D. Bennett. (2001). Wastewater dewatering polymer affect on biosolids odor emissions and microbial activity. *Water Environment Research*. 73(4), 363-367.

Rosenfeld, P.E., and C.L. Henry. (2001). Activated Carbon and Wood Ash Sorption of Wastewater, Compost, and Biosolids Odorants. *Water Environment Research*, 73, 388-393.

Rosenfeld, P.E., and Henry C. L., (2001). High carbon wood ash effect on biosolids microbial activity and odor. *Water Environment Research*. 131(1-4), 247-262.

Chollack, T. and **P. Rosenfeld. (**1998). Compost Amendment Handbook For Landscaping. Prepared for and distributed by the City of Redmond, Washington State.

Rosenfeld, P. E. (1992). The Mount Liamuiga Crater Trail. *Heritage Magazine of St. Kitts*, 3(2).

Rosenfeld, P. E. (1993). High School Biogas Project to Prevent Deforestation On St. Kitts. *Biomass Users Network*, 7(1).

Rosenfeld, P. E. (1998). Characterization, Quantification, and Control of Odor Emissions From Biosolids Application To Forest Soil. Doctoral Thesis. University of Washington College of Forest Resources.

Rosenfeld, P. E. (1994). Potential Utilization of Small Diameter Trees on Sierra County Public Land. Masters thesis reprinted by the Sierra County Economic Council. Sierra County, California.

Rosenfeld, P. E. (1991). How to Build a Small Rural Anaerobic Digester & Uses Of Biogas In The First And Third World. Bachelors Thesis. University of California.

Presentations:

Rosenfeld, P.E., "The science for Perfluorinated Chemicals (PFAS): What makes remediation so hard?" Law Seminars International, (May 9-10, 2018) 800 Fifth Avenue, Suite 101 Seattle, WA.

Rosenfeld, P.E., Sutherland, A; Hesse, R.; Zapata, A. (October 3-6, 2013). Air dispersion modeling of volatile organic emissions from multiple natural gas wells in Decatur, TX. *44th Western Regional Meeting, American Chemical Society.* Lecture conducted from Santa Clara, CA.

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Sok, H.L.; Waller, C.C.; Feng, L.; Gonzalez, J.; Sutherland, A.J.; Wisdom-Stack, T.; Sahai, R.K.; Hesse, R.C.; **Rosenfeld, P.E.** (June 20-23, 2010). Atrazine: A Persistent Pesticide in Urban Drinking Water. *Urban Environmental Pollution*. Lecture conducted from Boston, MA.

Feng, L.; Gonzalez, J.; Sok, H.L.; Sutherland, A.J.; Waller, C.C.; Wisdom-Stack, T.; Sahai, R.K.; La, M.; Hesse, R.C.; **Rosenfeld, P.E.** (June 20-23, 2010). Bringing Environmental Justice to East St. Louis, Illinois. *Urban Environmental Pollution.* Lecture conducted from Boston, MA.

Rosenfeld, P.E. (April 19-23, 2009). Perfluoroctanoic Acid (PFOA) and Perfluoroactane Sulfonate (PFOS) Contamination in Drinking Water From the Use of Aqueous Film Forming Foams (AFFF) at Airports in the United States. *2009 Ground Water Summit and 2009 Ground Water Protection Council Spring Meeting*, Lecture conducted from Tuscon, AZ.

Rosenfeld, P.E. (April 19-23, 2009). Cost to Filter Atrazine Contamination from Drinking Water in the United States" Contamination in Drinking Water From the Use of Aqueous Film Forming Foams (AFFF) at Airports in the United States. *2009 Ground Water Summit and 2009 Ground Water Protection Council Spring Meeting*. Lecture conducted from Tuscon, AZ.

Wu, C., Tam, L., Clark, J., **Rosenfeld, P**. (20-22 July, 2009). Dioxin and furan blood lipid concentrations in populations living near four wood treatment facilities in the United States. Brebbia, C.A. and Popov, V., eds., *Air Pollution XVII: Proceedings of the Seventeenth International Conference on Modeling, Monitoring and Management of Air Pollution*. Lecture conducted from Tallinn, Estonia.

Rosenfeld, P. E. (October 15-18, 2007). Moss Point Community Exposure To Contaminants From A Releasing Facility. *The 23rd Annual International Conferences on Soils Sediment and Water.* Platform lecture conducted from University of Massachusetts, Amherst MA.

Rosenfeld, P. E. (October 15-18, 2007). The Repeated Trespass of Tritium-Contaminated Water Into A Surrounding Community Form Repeated Waste Spills From A Nuclear Power Plant. *The 23rd Annual International Conferences on Soils Sediment and Water*. Platform lecture conducted from University of Massachusetts, Amherst MA.

Rosenfeld, P. E. (October 15-18, 2007). Somerville Community Exposure To Contaminants From Wood Treatment Facility Emissions. The *23rd Annual International Conferences on Soils Sediment and Water*. Lecture conducted from University of Massachusetts, Amherst MA.

Rosenfeld P. E. (March 2007). Production, Chemical Properties, Toxicology, & Treatment Case Studies of 1,2,3-Trichloropropane (TCP). *The Association for Environmental Health and Sciences (AEHS) Annual Meeting*. Lecture conducted from San Diego, CA.

Rosenfeld P. E. (March 2007). Blood and Attic Sampling for Dioxin/Furan, PAH, and Metal Exposure in Florala, Alabama. *The AEHS Annual Meeting.* Lecture conducted from San Diego, CA.

Hensley A.R., Scott, A., **Rosenfeld P.E.,** Clark, J.J.J. (August 21 – 25, 2006). Dioxin Containing Attic Dust And Human Blood Samples Collected Near A Former Wood Treatment Facility. *The 26th International Symposium on Halogenated Persistent Organic Pollutants – DIOXIN2006*. Lecture conducted from Radisson SAS Scandinavia Hotel in Oslo Norway.

Hensley A.R., Scott, A., **Rosenfeld P.E.,** Clark, J.J.J. (November 4-8, 2006). Dioxin Containing Attic Dust And Human Blood Samples Collected Near A Former Wood Treatment Facility. *APHA 134 Annual Meeting & Exposition.* Lecture conducted from Boston Massachusetts.

Paul Rosenfeld Ph.D. (October 24-25, 2005). Fate, Transport and Persistence of PFOA and Related Chemicals. Mealey's C8/PFOA. *Science, Risk & Litigation Conference.* Lecture conducted from The Rittenhouse Hotel, Philadelphia, PA.

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CONT

Paul Rosenfeld Ph.D. (September 19, 2005). Brominated Flame Retardants in Groundwater: Pathways to Human Ingestion, *Toxicology and Remediation PEMA Emerging Contaminant Conference*. Lecture conducted from Hilton Hotel, Irvine California.

Paul Rosenfeld Ph.D. (September 19, 2005). Fate, Transport, Toxicity, And Persistence of 1,2,3-TCP. *PEMA Emerging Contaminant Conference.* Lecture conducted from Hilton Hotel in Irvine, California.

Paul Rosenfeld Ph.D. (September 26-27, 2005). Fate, Transport and Persistence of PDBEs. *Mealey's Groundwater Conference.* Lecture conducted from Ritz Carlton Hotel, Marina Del Ray, California.

Paul Rosenfeld Ph.D. (June 7-8, 2005). Fate, Transport and Persistence of PFOA and Related Chemicals. *International Society of Environmental Forensics: Focus On Emerging Contaminants*. Lecture conducted from Sheraton Oceanfront Hotel, Virginia Beach, Virginia.

Paul Rosenfeld Ph.D. (July 21-22, 2005). Fate Transport, Persistence and Toxicology of PFOA and Related Perfluorochemicals. *2005 National Groundwater Association Ground Water And Environmental Law Conference*. Lecture conducted from Wyndham Baltimore Inner Harbor, Baltimore Maryland.

Paul Rosenfeld Ph.D. (July 21-22, 2005). Brominated Flame Retardants in Groundwater: Pathways to Human Ingestion, Toxicology and Remediation. *2005 National Groundwater Association Ground Water and Environmental Law Conference.* Lecture conducted from Wyndham Baltimore Inner Harbor, Baltimore Maryland.

Paul Rosenfeld, Ph.D. and James Clark Ph.D. and Rob Hesse R.G. (May 5-6, 2004). Tert-butyl Alcohol Liability and Toxicology, A National Problem and Unquantified Liability. *National Groundwater Association. Environmental Law Conference*. Lecture conducted from Congress Plaza Hotel, Chicago Illinois.

Paul Rosenfeld, Ph.D. (March 2004). Perchlorate Toxicology. *Meeting of the American Groundwater Trust*. Lecture conducted from Phoenix Arizona.

Hagemann, M.F., **Paul Rosenfeld, Ph.D.** and Rob Hesse (2004). Perchlorate Contamination of the Colorado River. *Meeting of tribal representatives*. Lecture conducted from Parker, AZ.

Paul Rosenfeld, Ph.D. (April 7, 2004). A National Damage Assessment Model For PCE and Dry Cleaners. *Drycleaner Symposium. California Ground Water Association*. Lecture conducted from Radison Hotel, Sacramento, California.

Rosenfeld, P. E., Grey, M., (June 2003) Two stage biofilter for biosolids composting odor control. *Seventh International In Situ And On Site Bioremediation Symposium Battelle Conference* Orlando, FL.

Paul Rosenfeld, Ph.D. and James Clark Ph.D. (February 20-21, 2003) Understanding Historical Use, Chemical Properties, Toxicity and Regulatory Guidance of 1,4 Dioxane. *National Groundwater Association. Southwest Focus Conference. Water Supply and Emerging Contaminants*.. Lecture conducted from Hyatt Regency Phoenix Arizona.

Paul Rosenfeld, Ph.D. (February 6-7, 2003). Underground Storage Tank Litigation and Remediation. *California CUPA Forum*. Lecture conducted from Marriott Hotel, Anaheim California.

Paul Rosenfeld, Ph.D. (October 23, 2002) Underground Storage Tank Litigation and Remediation. *EPA Underground Storage Tank Roundtable*. Lecture conducted from Sacramento California.

Rosenfeld, P.E. and Suffet, M. (October 7- 10, 2002). Understanding Odor from Compost, *Wastewater and Industrial Processes. Sixth Annual Symposium On Off Flavors in the Aquatic Environment. International Water Association*. Lecture conducted from Barcelona Spain.

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Rosenfeld, P.E. and Suffet, M. (October 7- 10, 2002). Using High Carbon Wood Ash to Control Compost Odor. *Sixth Annual Symposium On Off Flavors in the Aquatic Environment. International Water Association*. Lecture conducted from Barcelona Spain.

Rosenfeld, P.E. and Grey, M. A. (September 22-24, 2002). Biocycle Composting For Coastal Sage Restoration. *Northwest Biosolids Management Association*. Lecture conducted from Vancouver Washington..

Rosenfeld, P.E. and Grey, M. A. (November 11-14, 2002). Using High-Carbon Wood Ash to Control Odor at a Green Materials Composting Facility. *Soil Science Society Annual Conferenc*e. Lecture conducted from Indianapolis, Maryland.

Rosenfeld. P.E. (September 16, 2000). Two stage biofilter for biosolids composting odor control. *Water Environment Federation.* Lecture conducted from Anaheim California.

Rosenfeld. P.E. (October 16, 2000). Wood ash and biofilter control of compost odor. *Biofest.* Lecture conducted from Ocean Shores, California.

Rosenfeld, P.E. (2000). Bioremediation Using Organic Soil Amendments. *California Resource Recovery Association*. Lecture conducted from Sacramento California.

Rosenfeld, P.E., C.L. Henry, R. Harrison. (1998). Oat and Grass Seed Germination and Nitrogen and Sulfur Emissions Following Biosolids Incorporation With High-Carbon Wood-Ash. *Water Environment Federation 12th Annual Residuals and Biosolids Management Conference Proceedings*. Lecture conducted from Bellevue Washington.

Rosenfeld, P.E., and C.L. Henry. (1999). An evaluation of ash incorporation with biosolids for odor reduction. *Soil Science Society of America*. Lecture conducted from Salt Lake City Utah.

Rosenfeld, P.E., C.L. Henry, R. Harrison. (1998). Comparison of Microbial Activity and Odor Emissions from Three Different Biosolids Applied to Forest Soil. *Brown and Caldwell.* Lecture conducted from Seattle Washington.

Rosenfeld, P.E., C.L. Henry. (1998). Characterization, Quantification, and Control of Odor Emissions from Biosolids Application To Forest Soil. *Biofest.* Lecture conducted from Lake Chelan, Washington.

Rosenfeld, P.E, C.L. Henry, R. Harrison. (1998). Oat and Grass Seed Germination and Nitrogen and Sulfur Emissions Following Biosolids Incorporation With High-Carbon Wood-Ash. Water Environment Federation 12th Annual Residuals and Biosolids Management Conference Proceedings. Lecture conducted from Bellevue Washington.

Rosenfeld, P.E., C.L. Henry, R. B. Harrison, and R. Dills. (1997). Comparison of Odor Emissions From Three Different Biosolids Applied to Forest Soil. *Soil Science Society of America*. Lecture conducted from Anaheim California.

Teaching Experience:

UCLA Department of Environmental Health (Summer 2003 through 20010) Taught Environmental Health Science 100 to students, including undergrad, medical doctors, public health professionals and nurses. Course focused on the health effects of environmental contaminants.

National Ground Water Association, Successful Remediation Technologies. Custom Course in Sante Fe, New Mexico. May 21, 2002. Focused on fate and transport of fuel contaminants associated with underground storage tanks.

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National Ground Water Association; Successful Remediation Technologies Course in Chicago Illinois. April 1, 2002. Focused on fate and transport of contaminants associated with Superfund and RCRA sites.

California Integrated Waste Management Board, April and May, 2001. Alternative Landfill Caps Seminar in San Diego, Ventura, and San Francisco. Focused on both prescriptive and innovative landfill cover design.

UCLA Department of Environmental Engineering, February 5, 2002. Seminar on Successful Remediation Technologies focusing on Groundwater Remediation.

University Of Washington, Soil Science Program, Teaching Assistant for several courses including: Soil Chemistry, Organic Soil Amendments, and Soil Stability.

U.C. Berkeley, Environmental Science Program Teaching Assistant for Environmental Science 10.

Academic Grants Awarded:

California Integrated Waste Management Board. $41,000 grant awarded to UCLA Institute of the Environment. Goal: To investigate effect of high carbon wood ash on volatile organic emissions from compost. 2001.

Synagro Technologies, Corona California: $10,000 grant awarded to San Diego State University.
Goal: investigate effect of biosolids for restoration and remediation of degraded coastal sage soils. 2000.

King County, Department of Research and Technology, Washington State. $100,000 grant awarded to University of Washington: Goal: To investigate odor emissions from biosolids application and the effect of polymers and ash on VOC emissions. 1998.

Northwest Biosolids Management Association, Washington State. $20,000 grant awarded to investigate effect of polymers and ash on VOC emissions from biosolids. 1997.

James River Corporation, Oregon: $10,000 grant was awarded to investigate the success of genetically engineered Poplar trees with resistance to round-up. 1996.

United State Forest Service, Tahoe National Forest: $15,000 grant was awarded to investigating fire ecology of the Tahoe National Forest. 1995.

Kellogg Foundation, Washington D.C. $500 grant was awarded to construct a large anaerobic digester on St. Kitts in West Indies. 1993

Deposition and/or Trial Testimony:

In the Superior Court of the State of California, County of San Bernardino
Billy Wildrick, Plaintiff vs. BNSF Railway Company
Case No. CIVDS1711810
Rosenfeld Deposition 10-17-2022

In the State Court of Bibb County, State of Georgia
Richard Hutcherson, Plaintiff vs Norfolk Southern Railway Company
Case No. 10-SCCV-092007
Rosenfeld Deposition 10-6-2022

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In the Civil District Court of the Parish of Orleans, State of Louisiana
Millard Clark, Plaintiff vs. Dixie Carriers, Inc. et al.
Case No. 2020-03891
Rosenfeld Deposition 9-15-2022

In The Circuit Court of Livingston County, State of Missouri, Circuit Civil Division
Shirley Ralls, Plaintiff vs. Canadian Pacific Railway and Soo Line Railroad
Case No. 18-LV-CC0020
Rosenfeld Deposition 9-7-2022

In The Circuit Court of the 13th Judicial Circuit Court, Hillsborough County, Florida Civil Division
Jonny C. Daniels, Plaintiff vs. CSX Transportation Inc.
Case No. 20-CA-5502
Rosenfeld Deposition 9-1-2022

In The Circuit Court of St. Louis County, State of Missouri
Kieth Luke et. al. Plaintiff vs. Monsanto Company et. al.
Case No. 19SL-CC03191
Rosenfeld Deposition 8-25-2022

In The Circuit Court of the 13th Judicial Circuit Court, Hillsborough County, Florida Civil Division
Jeffery S. Lamotte, Plaintiff vs. CSX Transportation Inc.
Case No. NO. 20-CA-0049
Rosenfeld Deposition 8-22-2022

In State of Minnesota District Court, County of St. Louis Sixth Judicial District
Greg Bean, Plaintiff vs. Soo Line Railroad Company
Case No. 69-DU-CV-21-760
Rosenfeld Deposition 8-17-2022

In United States District Court Western District of Washington at Tacoma, Washington
John D. Fitzgerald Plaintiff vs. BNSF
Case No. 3:21-cv-05288-RJB
Rosenfeld Deposition 8-11-2022

In Circuit Court of the Sixth Judicial Circuit, Macon Illinois
Rocky Bennyhoff Plaintiff vs. Norfolk Southern
Case No. 20-L-56
Rosenfeld Deposition 8-3-2022

In Court of Common Pleas, Hamilton County Ohio
Joe Briggins Plaintiff vs. CSX
Case No. A2004464
Rosenfeld Deposition 6-17-2022

In the Superior Court of the State of California, County of Kern
George LaFazia vs. BNSF Railway Company.
Case No. BCV-19-103087
Rosenfeld Deposition 5-17-2022

In the Circuit Court of Cook County Illinois
Bobby Earles vs. Penn Central et. al.
Case No. 2020-L-000550
Rosenfeld Deposition 4-16-2022

In United States District Court Easter District of Florida
Albert Hartman Plaintiff vs. Illinois Central
Case No. 2:20-cv-1633
Rosenfeld Deposition 4-4-2022

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In the Circuit Court of the 4th Judicial Circuit, in and For Duval County, Florida
Barbara Steele vs. CSX Transportation
Case No.16-219-Ca-008796
Rosenfeld Deposition 3-15-2022

In United States District Court Easter District of New York
Romano et al. vs. Northrup Grumman Corporation
Case No. 16-cv-5760
Rosenfeld Deposition 3-10-2022

In the Circuit Court of Cook County Illinois
Linda Benjamin vs. Illinois Central
Case No. No. 2019 L 007599
Rosenfeld Deposition 1-26-2022

In the Circuit Court of Cook County Illinois
Donald Smith vs. Illinois Central
Case No. No. 2019 L 003426
Rosenfeld Deposition 1-24-2022

In the Circuit Court of Cook County Illinois
Jan Holeman vs. BNSF
Case No. 2019 L 000675
Rosenfeld Deposition 1-18-2022

In the State Court of Bibb County State of Georgia
Dwayne B. Garrett vs. Norfolk Southern
Case No. 20-SCCV-091232
Rosenfeld Deposition 11-10-2021

In the Circuit Court of Cook County Illinois
Joseph Ruepke vs. BNSF
Case No. 2019 L 007730
Rosenfeld Deposition 11-5-2021

In the United States District Court For the District of Nebraska
Steven Gillett vs. BNSF
Case No. 4:20-cv-03120
Rosenfeld Deposition 10-28-2021

In the Montana Thirteenth District Court of Yellowstone County
James Eadus vs. Soo Line Railroad and BNSF
Case No. DV 19-1056
Rosenfeld Deposition 10-21-2021

In the Circuit Court Of The Twentieth Judicial Circuit, St Clair County, Illinois
Martha Custer et al.cvs. Cerro Flow Products, Inc.
Case No. 0i9-L-2295
Rosenfeld Deposition 5-14-2021
Trial October 8-4-2021

In the Circuit Court of Cook County Illinois
Joseph Rafferty vs. Consolidated Rail Corporation and National Railroad Passenger Corporation d/b/a AMTRAK,
Case No. 18-L-6845
Rosenfeld Deposition 6-28-2021

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In the United States District Court For the Northern District of Illinois
Theresa Romcoe vs. Northeast Illinois Regional Commuter Railroad Corporation d/b/a METRA Rail
Case No. 17-cv-8517
Rosenfeld Deposition 5-25-2021

In the Superior Court of the State of Arizona In and For the Cunty of Maricopa
Mary Tryon et al. vs. The City of Pheonix v. Cox Cactus Farm, L.L.C., Utah Shelter Systems, Inc.
Case No. CV20127-094749
Rosenfeld Deposition 5-7-2021

In the United States District Court for the Eastern District of Texas Beaumont Division
Robinson, Jeremy et al vs. CNA Insurance Company et al.
Case No. 1:17-cv-000508
Rosenfeld Deposition 3-25-2021

In the Superior Court of the State of California, County of San Bernardino
Gary Garner, Personal Representative for the Estate of Melvin Garner vs. BNSF Railway Company.
Case No. 1720288
Rosenfeld Deposition 2-23-2021

In the Superior Court of the State of California, County of Los Angeles, Spring Street Courthouse
Benny M Rodriguez vs. Union Pacific Railroad, A Corporation, et al.
Case No. 18STCV01162
Rosenfeld Deposition 12-23-2020

In the Circuit Court of Jackson County, Missouri
Karen Cornwell, Plaintiff, vs. Marathon Petroleum, LP, Defendant.
Case No. 1716-CV10006
Rosenfeld Deposition 8-30-2019

In the United States District Court For The District of New Jersey
Duarte et al, Plaintiffs, vs. United States Metals Refining Company et. al. Defendant.
Case No. 2:17-cv-01624-ES-SCM
Rosenfeld Deposition 6-7-2019

In the United States District Court of Southern District of Texas Galveston Division
M/T Carla Maersk vs. Conti 168., Schiffahrts-GMBH & Co. Bulker KG MS "Conti Perdido" Defendant.
Case No. 3:15-CV-00106 consolidated with 3:15-CV-00237
Rosenfeld Deposition 5-9-2019

In The Superior Court of the State of California In And For The County Of Los Angeles – Santa Monica
Carole-Taddeo-Bates et al., vs. Ifran Khan et al., Defendants
Case No. BC615636
Rosenfeld Deposition 1-26-2019

In The Superior Court of the State of California In And For The County Of Los Angeles – Santa Monica
The San Gabriel Valley Council of Governments et al. vs El Adobe Apts. Inc. et al., Defendants
Case No. BC646857
Rosenfeld Deposition 10-6-2018; Trial 3-7-19

In United States District Court For The District of Colorado
Bells et al. Plaintiffs vs. The 3M Company et al., Defendants
Case No. 1:16-cv-02531-RBJ
Rosenfeld Deposition 3-15-2018 and 4-3-2018

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In The District Court Of Regan County, Texas, 112th Judicial District
Phillip Bales et al., Plaintiff vs. Dow Agrosciences, LLC, et al., Defendants
Cause No. 1923
Rosenfeld Deposition 11-17-2017

In The Superior Court of the State of California In And For The County Of Contra Costa
Simons et al., Plaintifs vs. Chevron Corporation, et al., Defendants
Cause No. C12-01481
Rosenfeld Deposition 11-20-2017

In The Circuit Court Of The Twentieth Judicial Circuit, St Clair County, Illinois
Martha Custer et al., Plaintiff vs. Cerro Flow Products, Inc., Defendants
Case No.: No. 0i9-L-2295
Rosenfeld Deposition 8-23-2017

In United States District Court For The Southern District of Mississippi
Guy Manuel vs. The BP Exploration et al., Defendants
Case No. 1:19-cv-00315-RHW
Rosenfeld Deposition 4-22-2020

In The Superior Court of the State of California, For The County of Los Angeles
Warrn Gilbert and Penny Gilber, Plaintiff vs. BMW of North America LLC
Case No. LC102019 (c/w BC582154)
Rosenfeld Deposition 8-16-2017, Trail 8-28-2018

In the Northern District Court of Mississippi, Greenville Division
Brenda J. Cooper, et al., Plaintiffs, vs. Meritor Inc., et al., Defendants
Case No. 4:16-cv-52-DMB-JVM
Rosenfeld Deposition July 2017

In The Superior Court of the State of Washington, County of Snohomish
Michael Davis and Julie Davis et al., Plaintiff vs. Cedar Grove Composting Inc., Defendants
Case No. 13-2-03987-5
Rosenfeld Deposition, February 2017
Trial March 2017

In The Superior Court of the State of California, County of Alameda
Charles Spain., Plaintiff vs. Thermo Fisher Scientific, et al., Defendants
Case No. RG14711115
Rosenfeld Deposition September 2015

In The Iowa District Court In And For Poweshiek County
Russell D. Winburn, et al., Plaintiffs vs. Doug Hoksbergen, et al., Defendants
Case No. LALA002187
Rosenfeld Deposition August 2015

In The Circuit Court of Ohio County, West Virginia
Robert Andrews, et al. v. Antero, et al.
Civil Action No. 14-C-30000
Rosenfeld Deposition June 2015

In The Iowa District Court for Muscatine County
Laurie Freeman et. al. Plaintiffs vs. Grain Processing Corporation, Defendant
Case No. 4980
Rosenfeld Deposition May 2015

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In the Circuit Court of the 17th Judicial Circuit, in and For Broward County, Florida
Walter Hinton, et. al. Plaintiff, vs. City of Fort Lauderdale, Florida, a Municipality, Defendant.
Case No. CACE07030358 (26)
Rosenfeld Deposition December 2014

In the County Court of Dallas County Texas
Lisa Parr et al, Plaintiff, vs. Aruba et al, Defendant.
Case No. cc-11-01650-E
Rosenfeld Deposition: March and September 2013
Rosenfeld Trial April 2014

In the Court of Common Pleas of Tuscarawas County Ohio
John Michael Abicht, et al., Plaintiffs, vs. Republic Services, Inc., et al., Defendants
Case No. 2008 CT 10 0741 (Cons. w/ 2009 CV 10 0987)
Rosenfeld Deposition October 2012

In the United States District Court for the Middle District of Alabama, Northern Division
James K. Benefield, et al., Plaintiffs, vs. International Paper Company, Defendant.
Civil Action No. 2:09-cv-232-WHA-TFM
Rosenfeld Deposition July 2010, June 2011

In the Circuit Court of Jefferson County Alabama
Jaeanette Moss Anthony, et al., Plaintiffs, vs. Drummond Company Inc., et al., Defendants
Civil Action No. CV 2008-2076
Rosenfeld Deposition September 2010

In the United States District Court, Western District Lafayette Division
Ackle et al., Plaintiffs, vs. Citgo Petroleum Corporation, et al., Defendants.
Case No. 2:07CV1052
Rosenfeld Deposition July 2009

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