

California High-Speed Rail Authority

Bakersfield to Palmdale Project

Section

FINAL

General Conformity

Determination

JULY 2021



California High-Speed Rail System, Bakersfield to Palmdale Section
Final General Conformity Determination

Prepared by:

U.S. Department of Transportation
Federal Railroad Administration

This Final General Conformity Determination has been prepared by the Federal Railroad Administration (FRA), pursuant to Section 176(c) of the Federal Clean Air Act, 42 U.S.C. 7506(c)(1), and its implementing regulations (“General Conformity Rule”). Specifically, this Final General Conformity Determination documents FRA’s finding that the California High-Speed Rail System, Bakersfield to Palmdale Section will comply with the General Conformity Rule, provided that the nitrogen oxides (NO_x) and volatile organic compound (VOC) emissions caused by the construction of the Project, will be offset through a Voluntary Emission Offset Agreement (VERA) with the San Joaquin Valley Unified Air Pollution Control District.

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Appendix

Appendix A: Final General Conformity Determination Comments and Responses

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ACRONYMS AND ABBREVIATIONS

AIA	air impact assessment
AQMD	Air Quality Management District
Authority	California High-Speed Rail Authority
AVAQMD	Antelope Valley Air Quality Management District
CAA	Clean Air Act
CaIEMod	California Emissions Estimator Model
CARB	California Air Resources Board
CCNM	César E. Chávez National Monument
CEQA	California Environmental Quality Act
C.F.R.	Code of Federal Regulations
CO	carbon monoxide
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EKAPCD	Eastern Kern Air Pollution Control District
EMFAC2014	EMission FACtors 2014
EMMA	Environmental Mitigation Management and Assessment
FRA	Federal Railroad Administration
GAMAQI	Guide for Assessing and Mitigating Air Quality Impacts
GHG	greenhouse gas
HP	horsepower
HS	hydrogen sulfide
HSIPR	High-Speed Intercity Passenger Rail
HSR	high-speed rail
IAMFs	Impact Avoidance and Minimization Features
LMF	Light Maintenance Facility
MDAB	Mojave Desert Air Basin
MOWF	Maintenance-of-Way Facility
Mph	miles per hour
MPO	metropolitan planning organizations
NAAQS	National Ambient Air Quality Standards
O ₃	ozone
PM _{2.5}	particulate matter less than 2.5 microns in diameter
PM ₁₀	particulate matter less than 10 microns in diameter
RoadMod	Road Construction Emissions Model
ROD	Record of Decision

SIP	State Implementation Plan
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SO _x	sulfur oxide
USEPA	United States Environmental Protection Agency
VERA	Voluntary Emissions Reduction Agreement
VHT	vehicle hours traveled
VMT	vehicle miles traveled

EXECUTIVE SUMMARY

The California High-Speed Rail (HSR) System will provide intercity, high-speed service on more than 800 miles of guideway throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the southern Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The Bakersfield to Palmdale HSR Section (“Project” or “Action”), which is the focus of this General Conformity Determination, is a critical link connecting the Merced to Fresno, and Bakersfield to Palmdale HSR sections to the Palmdale to Los Angeles HSR sections.¹

The General Conformity Rule, as codified in Title 40 Code of Federal Regulations (CFR) Part 93, Subpart B, establishes the process by which federal agencies determine conformance of proposed projects that are federally funded or require federal approval with applicable air quality standards. This determination must demonstrate that a Proposed Action would not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions towards attainment. The California High-Speed Rail Authority (Authority), as the Action proponent, is receiving federal grant funds through the Federal Railroad Administration’s (FRA) High-Speed Intercity Passenger Rail program. The Action may also receive FRA safety approvals. Because of the federal funding and potential safety approvals; the Action is subject to the General Conformity Rule; and because construction-phase emissions (without mitigation) would exceed General Conformity emission thresholds, the Action is not exempt and must demonstrate conformity.

FRA prepared a Draft General Conformity Determination, pursuant to 40 CFR part 93, subpart B, which establishes the process for complying with the General Conformity requirements of the Clean Air Act. FRA published a notice in the Federal Register on May 13, 2021 advising the public of the availability of the Draft Conformity Determination for a 30-day review and comment period. The Draft Conformity Determination was published at <http://www.regulations.gov>, Docket No. FRA-2021-0046. The comment period of the Draft Conformity Determination closed on June 14, 2021. FRA received one comment regarding *Coccidioides immitis*, or more commonly known as the Valley Fever fungus, and a letter of support from the San Joaquin Valley Air District. Both letters were responded to in Appendix A of this Final General Conformity Determination.

This Final General Conformity Determination documents FRA’s finding that the Action complies with the General Conformity Rule and that it conforms to the purposes of the area’s approved State Implementation Plan and is consistent with all applicable requirements. The Final General Conformity Determination is available at <http://www.regulations.gov>, Docket No. FRA-2021-0046, and on FRA’s website at <https://railroads.dot.gov/environment/environmental-reviews/clean-air-act-california-general-conformity-determinations>. This Final General Conformity Determination is based on the Impact Avoidance and Minimization Measures and Mitigation Measures that were described in Section 3.3.8 of the EIR/EIS and that will be implemented for the Action. This compliance is demonstrated herein as follows:

- The operation of the Action would result in a reduction of regional emissions of all applicable air pollutants and would not cause a localized exceedance of an air quality standard; and
- Whereas emissions generated during the construction of the Action would exceed General Conformity thresholds for two pollutants, these emission increases would be offset through a Voluntary Emission Reduction Agreement (VERA) with the San Joaquin Valley Air Pollution Control District (SJVAPCD), the Air Quality Investment Program in the Antelope Valley Air Quality Management District (AVAQMD), and the Emission Banking Certificate Program in the Eastern Kern Air Pollution Control District (EKAPCD).

¹ As part of its first phase, the California HSR system is currently planned as seven distinct sections from San Francisco in the north to Los Angeles and Anaheim in the south.

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1 INTRODUCTION

This document is the Final General Conformity Determination for the Bakersfield to Palmdale Section of the California High-Speed Rail (HSR) System (“Project” or “Federal Action”) and is required by the implementing regulations of Section 176 of the Clean Air Act (CAA). Section 176(c)(1) of the CAA prohibits federal agencies from engaging in, supporting, or providing financial assistance for licensing, permitting or approving any activities that do not conform to an approved CAA implementation plan. That approved plan may be a federal, state or tribal implementation plan.

The CAA defines nonattainment areas as geographic regions that have been designated as not meeting one or more of the National Ambient Air Quality Standards (NAAQS). The CAA requires that each state prepare a State Implementation Plan (SIP) for each nonattainment area, and a maintenance plan be prepared for each former non-attainment area that subsequently demonstrated compliance with the standards. The SIP is a state’s plan for how it will meet the NAAQS by the deadlines established by the CAA.

The General Conformity Rule is codified in Title 40 Code of Federal Regulations (C.F.R.) Part 93, Subpart B, “Determining Conformity of General Federal Actions to State or Federal Implementation Plans.” Conformity is defined as “upholding an implementation plan’s purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards.” 40 C.F.R. Part 93 also establishes the process by which federal agencies determine conformance of proposed projects that are federally funded or require federal approval. This determination must demonstrate that the Proposed Action would not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions towards attainment. Since the Action is receiving federal funds through grants with the Federal Railroad Administration (FRA) and may also receive safety approvals from FRA, it is an action that may be subject to the General Conformity Rule.

This Final General Conformity Determination is being issued after the release of the Bakersfield to Palmdale Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS), which was prepared in accordance with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). Because the analysis used for the EIR/EIS also generated the information necessary for the General Conformity Determination, specific analysis may be incorporated herein by reference.

1.1 Regulatory Status of Study Area

By way of background, in addition to the regulations covering the General Conformity Rule, on November 24, 1993, the U.S. Environmental Protection Agency (EPA) promulgated final transportation conformity regulations to address transportation plans, programs, and projects developed, funded or approved under title 23 U.S. Code or the Federal Transit Act, 49 U.S. Code 1601 et seq. (40 C.F.R. Part 93 Subpart A). These regulations have been revised several times since they were first issued. While the transportation conformity regulations do not apply to this Action (see Section 1.2), many of the transportation planning documents developed under those regulations are helpful in understanding the regional air quality and planning status of the study area.

The Bakersfield to Palmdale Project Section passes through three air quality management districts and two air basins: the San Joaquin Valley Air Pollution Control District (SJVAPCD), the Eastern Kern Air Pollution Control District (EKAPCD), and the Antelope Valley Air Quality Management District (AVAQMD). The SJVAPCD and the San Joaquin Air Basin encompass the same area; the EKAPCD and the AVAQMD are both located within the Mojave Desert Air Basin.

Planning documents for pollutants for which the study area is classified as a federal nonattainment or maintenance area are developed by the SJVAPCD, EKAPCD, AVAQMD, and the California Air Resources Board (CARB), and approved by USEPA. Table 1 lists the planning documents relevant to the proposed Action’s study area.

Table 1 Planning Documents Relevant to Action's Study Area

Type of Plan	Status
San Joaquin Valley Air Pollution Control District	
1-Hour Ozone (O ₃) Attainment Plan	On March 8, 2010, the USEPA approved the San Joaquin Valley's 2004 Extreme Ozone Attainment Plan for the 1-hour O ₃ standard. However, effective June 15, 2005, the USEPA revoked the federal 1-hour O ₃ standard for areas, including SJVAB. ¹ Due to subsequent litigation, the USEPA withdrew its plan approval in November 2012, and the SJVAPCD and CARB withdrew this plan from consideration. SJVAPCD adopted a revised plan in September 2013 and is currently seeking CARB's approval.
8-Hour O ₃ Attainment Plan	On May 5, 2010, the USEPA reclassified the 8-hour O ₃ nonattainment status of San Joaquin Valley from "serious" to "extreme." The reclassification requires the state to incorporate more stringent requirements, such as lower permitting thresholds and implementing reasonably available control technologies at more sources. ¹ The 2007 Ozone Plan contained a comprehensive and exhaustive list of regulatory and incentive-based measures to reduce emissions of O ₃ and particulate matter precursors throughout the San Joaquin Valley. On December 18, 2007, the SJVAPCD Governing Board adopted the plan with an amendment to extend the rule adoption schedule for organic waste operations. On January 8, 2009, the USEPA found that the motor vehicle budgets for the years 2008, 2020, and 2030 from the 2007 8-hour Ozone Plan were not adequate for transportation conformity purposes. ²
Particulate Matter, 10 microns or less in diameter (PM ₁₀) Maintenance Plan	On September 25, 2008, the USEPA redesignated the San Joaquin Valley to attainment for the PM ₁₀ NAAQS and approved the 2007 PM ₁₀ Maintenance Plan. ³
Particulate Matter, 2.5 microns or less in diameter (PM _{2.5}) Attainment Plan	The 2018 Plan for the 1997, 2006, and 2012 PM _{2.5} Standard, approved by the District Governing Board on November 15, 2018, will bring the San Joaquin Valley into attainment of the USEPA's 1997 annual PM _{2.5} standard, 2006 24-hour PM _{2.5} standard, and 2012 annual PM _{2.5} standard as expeditiously as practicable. ⁴ The plan provides measures designed to reduce emissions such that the valley will attain the federal standards as soon as possible.
Carbon Monoxide (CO) Maintenance Plan	On July 22, 2004, CARB approved an update to the State Implementation Plan that shows how 10 areas, including the SJVAB, will maintain the CO standard through 2018. On November 30, 2005, the USEPA approved and promulgated the implementation plans and designation of areas for air quality purposes. ⁵
Eastern Kern Air Pollution Control District	
2017 Ozone Attainment Plan	On July 27, 2017, the EKAPCD adopted the 2017 Ozone Attainment Plan for the Eastern Kern County nonattainment area. The Plan demonstrates that the air quality improvement was achieved due to successful implementation of ozone control strategies contained in the region's SIP. It also demonstrates that significant ozone precursor emission reductions that have been impacted in the region are permanent and enforceable. A maintenance plan is also included to ensure that the region would not experience exceedance. The Plan requests a redesignation in accordance with the Federal Clean Air Act. ⁶

Type of Plan	Status
Antelope Valley Air Quality Management District	
Western Mojave Desert Ozone Attainment Plan	The Western Mojave Desert non-attainment area, which includes the AVAQMD, was designated non-attainment for the NAAQS for ozone by the USEPA on April 15, 2004. The USEPA designated the Western Mojave Desert area as non-attainment area for the 8-hour ozone NAAQS. The AVAQMD is included in the Western Mojave Desert non-attainment area and has adopted state and federal attainment plans for the region within its jurisdiction. The 2007 Western Mojave Desert Ozone Attainment Plan includes the latest planning assumptions regarding population, vehicle activity, and industrial activity and addresses all existing and forecasted ozone precursor-producing activities within the Antelope Valley through the year 2020. The document includes updates to the necessary information to allow general and transportation conformity findings to be made within the Antelope Valley. ⁷
Antelope Valley Ozone Attainment Plan	The 2004 Antelope Valley Ozone Attainment Plan includes AVAQMD's review and update of all elements of the Air Quality Management Plan that had been previously prepared by the South Coast Air Pollution Control District, when that District had jurisdiction of the Antelope Valley. The Plan indicates Antelope Valley will also show significant progress toward attainment of the CAAQS for the ozone standard. The document also includes the latest planning assumptions regarding population, vehicle activity, and industrial activity and addresses all existing and forecasted ozone precursor-producing activities within the Antelope Valley. ⁸

- Sources: ¹ San Joaquin Valley Air Pollution Control District, 2004
² San Joaquin Valley Air Pollution Control District, 2007a
³ San Joaquin Valley Air Pollution Control District, 2007b
⁴ San Joaquin Valley Air Pollution Control District, 2018
⁵ California Air Resources Board, 2004
⁶ Eastern Kern Air Pollution Control District, 2017
⁷ Antelope Valley Air Quality Management District, 2008
⁸ Antelope Valley Air Quality Management District, 2004

AVAQMD = Antelope Valley Air Quality Management District
 CARB = California Air Resources Board
 CO = carbon monoxide
 EKAPCD = Eastern Kern Air Pollution Control District
 NAAQS = National Ambient Air Quality Standards
 O₃ = ozone
 PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter
 PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter
 SJVAB = San Joaquin Valley Air Basin
 SJVAPCD = San Joaquin Valley Air Pollution Control District
 USEPA = U.S. Environmental Protection Agency

1.2 General Conformity Requirements

On November 30, 1993, USEPA promulgated final General Conformity regulations at 40 C.F.R. Part 93 Subpart B for all federal activities except highways and transit programs covered by Transportation Conformity. The regulations in Subpart B were subsequently amended in March of 2010. The Action requires approval by FRA, and because the Action will not be funded or require approval(s) under Title 23 U.S. Code or the Federal Transit Act, 49 U.S. Code 1601 et seq., the General Conformity requirements are applicable, rather than transportation conformity. In general terms, unless a project is exempt under 40 C.F.R. § 93.153(c) or is not on the agency's presumed-to-conform list pursuant to 40 C.F.R. § 93.153(f), a General Conformity Determination is required where a federal action in a nonattainment or maintenance area causes an increase in the total of direct and indirect emissions of the relevant criteria pollutants and precursor pollutants that are equal to or exceed certain *de minimis* rates.

The General Conformity regulations incorporate a stepwise process, beginning with an applicability analysis. According to USEPA's General Conformity Guidance: Questions and Answers (USEPA 1994) (USEPA Guidance), before any approval is given for a federal action to go forward, the federal agency must apply the applicability requirements found at 40 C.F.R. §

93.153 to the federal action and/or determine on a pollutant-by-pollutant basis, whether a determination of General Conformity is required. During the applicability analysis, the federal agency determines the following:

- Whether the action will occur in a nonattainment or maintenance area;
- Whether one or more of the specific exemptions apply to the action;
- Whether the federal agency has included the action on its list of presumed-to-conform actions;
- Whether the total direct and indirect emissions are below or above the *de minimis* levels; and/or
- Where a facility has an emissions budget approved by the State or Tribe as part of the SIP or TIP, the federal agency determines that the emissions from the proposed action are within the budget (USEPA 2010).

The USEPA Guidance states that the applicability analysis can be (but is not required to be) completed concurrently with any analysis required under NEPA. The applicability analysis for this Action is described in Section 8.0.

If through the applicability analysis process the responsible federal agency determines that the General Conformity regulations do not apply to the federal action, no further analysis or documentation is required. If, however, the General Conformity regulations do apply to the federal action, the responsible federal agency must conduct a conformity evaluation in accordance with the criteria and procedures in the implementing regulations; publish a Final determination of General Conformity for public review; and then publish the final determination of General Conformity.

To make a conformity determination, the federal agency must demonstrate conformity by one or more of several prescribed methods. These methods include:

- Demonstrating that the direct and indirect emissions are specifically identified in the relevant implementation plan;
- Obtaining a written statement from the entity responsible for the implementation plan that the total indirect and direct emissions from the action, along with other emissions in the area, will not exceed the total implementation plan emission budget; or
- Fully offsetting the total direct and indirect emissions by reducing emissions of the same pollutant in the same nonattainment or maintenance area.

2 DESCRIPTION OF THE FEDERAL ACTION REQUIRING CONFORMITY EVALUATION

In accordance with applicable General Conformity regulations and guidance, when a General Conformity Determination is necessary, the FRA conducts a General Conformity evaluation for the specific federal action associated with the preferred alternative for a project or program (USEPA 1994), and FRA must issue a positive conformity determination before the federal action is approved. Each federal agency is responsible for determining conformity of those proposed actions over which it has jurisdiction. This Final General Conformity Determination is related only to those activities included in the federal action pertaining to the Action, which is the Action's potential approval through a NEPA Record of Decision (ROD). The Action is described further in Section 3.0 below.

General Conformity requirements only apply to federal actions proposed in nonattainment areas (i.e., areas where one or more NAAQS are not being achieved at the time of the proposed action and requiring SIP provisions to demonstrate how attainment will be achieved) and in maintenance areas (i.e., areas recently reclassified from nonattainment to attainment and requiring SIP provisions to demonstrate how attainment will be maintained).

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3 CALIFORNIA HIGH SPEED RAIL PROJECT

3.1 California High Speed Rail System

The Authority, a state governing board formed in 1996, is responsible for planning, designing, constructing, and operating the HSR System. Its mandate is to develop a high-speed rail system connecting the state's major population centers and coordinating with the state's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports.

The HSR System will provide intercity, high-speed service on more than 800 miles of railroad throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the southern Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. It will use state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, including contemporary safety, signaling, and automated train-control systems, with trains capable of operating up to 220 miles per hour (mph) over a fully grade-separated, dedicated guideway alignment.

FRA is responsible for oversight and regulation of railroad safety and is also charged with the implementation of the High-Speed Intercity Passenger Rail (HSIPR) financial assistance program. As part of the HSIPR Program, FRA is providing partial funding for the environmental analysis and documentation required under NEPA, CEQA and other related environmental laws. Pursuant to U.S. Code (U.S.C.) Title 23 Section 327, under the NEPA Assignment Memorandum of Understanding (MOU) between FRA and the State of California, effective July 23, 2019, the Authority is the federal lead agency for environmental reviews for all Authority Phase 1 and Phase 2 California HSR System projects. The FRA maintains responsibility to perform Clean Air Act Conformity determinations under the NEPA Assignment MOU. The Authority and the FRA have agreed to collaborate on the development of conformity determinations. As part of this collaboration, the Authority has provided the FRA this Final General Conformity Determination and supporting information, as well as the Authority's proposed approach for achieving general conformity. The FRA will make the ultimate general conformity determination. In addition to its involvement in the environmental analysis and documentation, FRA is also providing partial funding for the final design and construction of the initial construction section of the HSR System, which includes activities analyzed in this Final Conformity Determination.

In April 2012, FRA and the Authority published the Final EIR/EIS for the Merced to Fresno Section of the HSR System. The Authority certified the EIR and adopted the project in May, while the FRA issued its ROD in September 2012. The Merced to Fresno Section is within the San Joaquin Valley Air Basin (SJVAB) and a General Conformity Determination was prepared as part of the environmental process to comply with the CAA. It is worth noting that the Merced to Fresno General Conformity Determination includes the Authority's commitment to offset all emissions to net zero through a Voluntary Emissions Reduction Agreement (VERA) between the Authority and the SJVAPCD.

Although the Authority considers the Bakersfield to Palmdale section of the HSR System independent of the other HSR System sections for purposes of NEPA and CEQA analysis, certain construction activities within the Merced to Fresno Section, as well as within the Fresno to Bakersfield and San Jose to Merced Sections, may occur concurrently with Bakersfield to Palmdale Section construction activities. Therefore, estimates of these cumulative emissions within the SJVAPCD, EKAPCD, and AVAQMD have been presented in Section 13.0 of this document. These emissions estimates have been included in this document in the interest of the full disclosure of construction emissions that may occur in the SJVAPCD, EKAPCD, and AVAQMD from other sections of the HSR Project; each of these sections will undergo separate conformity determinations at a later date.

3.2 California High Speed Rail System – Bakersfield to Palmdale Section

The purpose of the Bakersfield to Palmdale Section of the HSR System is to implement the California HSR System between Bakersfield and Palmdale, providing the public with electric-

powered high-speed rail service that provides predictable and consistent travel times between major urban centers and connectivity to airports, mass transit systems, and the highway network in the south San Joaquin Valley and Mojave Desert, and to connect the northern and southern portions of the HSR System.

The Bakersfield to Palmdale Section would be approximately 80 miles in length and would traverse valley, mountain, and high desert terrain, as well as urban, rural, and agricultural lands. From the north, this section would begin at the Bakersfield Station and travel south and southeast through the Tehachapi Mountains, then descend into the Antelope Valley where it would terminate at the Palmdale Station in the south. This section includes a potential Light Maintenance Facility (LMF) and a Maintenance-of-Way Facility (MOWF) in the Lancaster area.

The Bakersfield to Palmdale Project Section would include surface, underground, and elevated track types with varying profiles. Surface tracks would be built on concrete or ballast material (a thick bed of angular rock) placed on compacted soil. To the extent practicable, fill material for the rail bed would be obtained from on-site excavations. Underground tracks would be in areas with cut slopes and retaining walls or tunnels. Although tunnels are underground and hidden from sight, their approaches have deep open excavations and extensive portal facilities necessary for maintenance and safety. Elevated tracks would be on retained fill (earth), embankments, or structures and would consist of cast-in-place, reinforced-concrete columns supporting the box girders and bridge deck.

The EIR/EIS for the Bakersfield to Palmdale Project Section examines alignment alternatives, stations, LMF, and MOWF sites within the general Railway corridor. The following alternatives are considered: Alternative 1, Alternative 2, Alternative 3, and Alternative 5. The following stations are considered: the Bakersfield Station and the Palmdale Station. The EIR/EIS also considers the César E. Chávez National Monument Design Option (CCNM Design Option), which would result in only a minimal change in construction emissions due to the additional 124 feet of track required for the design, and the Refined CCNM Design Option, which would be anticipated to result in slightly higher emissions due to the additional 2,006 feet of track required for the design. Total emissions would be 0.028 percent higher with the CCNM Design Option. The Refined CCNM option would increase the length of the line by 0.45 percent and would require additional off-haul associated with additional earthwork activities. Emission estimates presented in this Final General Conformity Determination for each Bakersfield to Palmdale Project Section (B-P) Build Alternative would be applicable with or without the CCNM Design Option, due to rounding, and the difference would be within the margin of error of the model estimates. Emission estimates for each B-P Alternative with the Refined CCNM Design Option are identified in this Final General Conformity Determination.

4 AIR QUALITY CONDITIONS IN THE STUDY AREA

4.1 Meteorology and Climate

Air quality is affected by both the rate and location of pollutant emissions, and by meteorological conditions that influence movement and dispersal of pollutants in the atmosphere. Atmospheric conditions, such as wind speed, wind direction, and air temperature gradients, along with local topography, provide the link between air pollutant emissions and local air quality levels. Elevation and topography can affect localized air quality.

The Action traverses two air basins. The northern section of the Action is in the SJVAB, which encompasses the southern third of California's Central Valley. The southern section of the Action is on the western edge of the Mojave Desert Air Basin (MDAB).

4.1.1 San Joaquin Valley Air Basin

The SJVAB is approximately 250 miles long and is shaped like a narrow bowl. The sides and southern boundary of the bowl are bordered by mountain ranges. The valley's weather conditions include frequent temperature inversions; long, hot summers; and stagnant, foggy winters, all of which are conducive to the formation and retention of air pollutants (SJVAPCD 2011).

The SJVAB is typically arid in the summer months with cool temperatures and prevalent tule fog (i.e., a dense ground fog) in the winter and fall. The average high temperature in the summer months is in the mid-90s and the average low in the winter is in the high 40s. January is typically the wettest month of the year with an average of about 2 inches of rain. Wind direction is typically from the northwest with speeds around 30 mph (Western Regional Climate Center 2011).

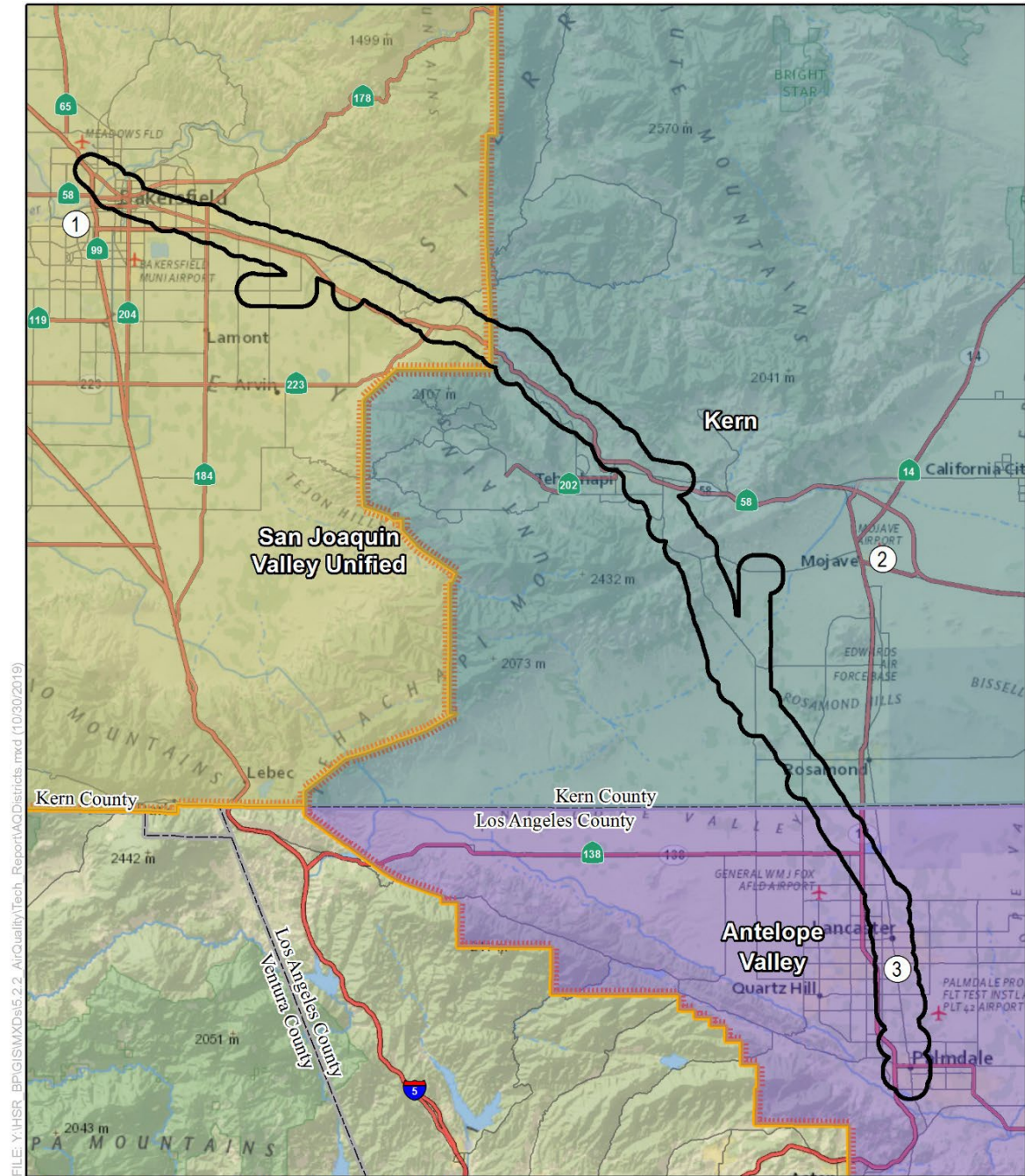
4.1.2 Mojave Desert Air Basin

The MDAB is separated from populated valleys and coastal areas to the west by several mountain ranges. These valleys and coastal areas are the major source of ozone precursor emissions affecting ozone exceedances within the Kern County part of the Mojave Desert. Surrounding mountain ranges contain a limited number of passes serving as "transportation corridors." Air quality in Kern County is primarily influenced by the Tehachapi Pass corridor with some influence through Soledad Canyon (EKAPCD 2003).

During the summer the MDAB is generally influenced by a Pacific Subtropical High cell that sits off the coast, inhibiting cloud formation and encouraging daytime solar heating. Most desert moisture arrives from infrequent warm, moist, and unstable air masses from the south. The MDAB averages between 3 and 7 inches of precipitation per year (from 16 to 30 days with at least 0.01 inch of precipitation). The MDAB is classified as a dry-hot desert climate, with portions classified as dry-very hot desert, to indicate at least 3 months have maximum average temperatures over 100.4-degrees Fahrenheit (AVAQMD 2011). Predominant surface wind flow patterns are southerly and westerly, transporting air pollution from the SJVAB through the Tehachapi Mountains and over the San Gabriel and San Bernardino Mountains (CARB 2015).

4.2 Ambient Air Quality in the Study Area

CARB maintains ambient air monitoring stations for criteria pollutants throughout California. The stations closest to the B-P Build Alternative alignments are the 43301 Division Street station in the City of Lancaster; the 923 Poole Street station in Mojave; and the 5558 California Avenue station in Bakersfield. These stations monitor NO₂, O₃, PM₁₀, PM_{2.5}, and CO. The land uses in the region range from urban and residential to rural and agricultural, and these stations represent these land use types. Air quality standards, primarily for O₃ and particulate matter, have been exceeded in the SJVAPCD, the EKAPCD, and the AVAQMD because of existing industrial, mobile, and agricultural sources. The four monitoring station locations are shown on Figure 1.



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SOURCE: Esri/National Geographic (2014, 2015); CHSRA (10/2019)

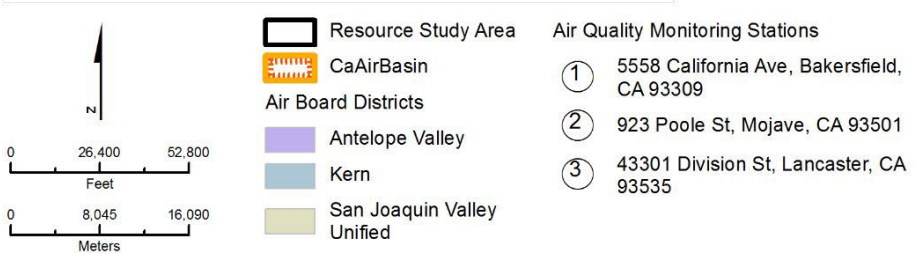


Figure 1 Air Quality Monitoring Stations Closest to Action

A brief summary of the monitoring data includes the following:

- Monitored data from 2017 through 2019 do not exceed either the state or federal standards for CO. The Mojave and Bakersfield stations were not monitored for CO during 2017 through 2019; therefore, CO data from the 2000 S Union Avenue, Bakersfield, monitoring site is included.
- O₃ values for the region exceed the state and national 8-hour O₃ standards for all three stations for years 2017 through 2019. O₃ values for the region also exceed the state 1-hour O₃ standard for all stations for every year from 2017 through 2019 except in 2019 at the 923 Poole Street station in Mojave.
- The PM₁₀ values for the region exceed the national 24-hour PM₁₀ standard for the Lancaster and Mojave stations for the year 2019. The state 24-hour PM₁₀ concentrations were exceeded at all stations for all years. However, the number of days over the state standard was not available.
- The PM_{2.5} values for the region exceed the national 24-hour PM_{2.5} standard for the Lancaster station for 2018, the Bakersfield station for 2018, and the Bakersfield station for 2017 through 2019.
- SO₂ values were not monitored at any of the three stations or the additional station at 2000 S Union Avenue in Bakersfield between 2017 and 2019.

Table 2 lists the three monitoring stations nearest to the Action and ambient criteria pollutant concentrations for 2017, 2018, and 2019.

Table 2 Ambient Critical Pollutant Concentration Data at Air Quality Monitoring Stations Closest to the Action

Air Pollutant	Standard/Exceedance	43301 Division Street, Lancaster			923 Poole Street, Mojave			5558 California Avenue, Bakersfield		
		2017	2018	2019	2017	2018	2019	2017	2018	2019
Carbon Monoxide (CO) ¹	Year Coverage	NM	NM	NM	NM	NM	NM	NM	NM	NM
	Max. 1-hour Concentration (ppm)	1.3	1.2	1.4	1.8	1.9	1.2	1.8	1.9	1.2
	Max. 8-hour Concentration (ppm)	0.9	1.0	0.9	1.2	1.3	1.0	1.2	1.3	1.0
	Number of Days>Federal 1-hour Std of >35 ppm	0	0	0	0	0	0	0	0	0
	Number of Days>Federal 8-hour Std of >9 ppm	0	0	0	0	0	0	0	0	0
	Number of Days>California 8-hour Std of >9 ppm	0	0	0	0	0	0	0	0	0
Ozone (O ₃)	Year Coverage ²	98%	96%	91%	99%	99%	99%	99%	100%	98%
	Max. 1-hour Concentration (ppm)	0.109	0.125	0.096	0.097	0.111	0.085	0.122	0.107	0.097
	Max. 8-hour Concentration (ppm)	0.087	0.105	0.081	0.086	0.095	0.077	0.104	0.098	0.088
	Number of Days>Federal 8-hour Std of >0.070 ppm	43	48	13	35	53	10	85	60	24
	Number of Days>California 1-hour Std of >0.09 ppm	10	5	N/A	1	8	0	11	8	N/A
	Number of Days>California 8-hour Std of >0.07 ppm	43	49	N/A	37	56	N/A	87	34	N/A
Nitrogen Dioxide (NO ₂)	Year Coverage	87%	97%	N/A	NM	NM	NM	97%	97%	N/A
	Max. 1-hour Concentration (ppm)	46.5	47.6	50.0	NM	NM	NM	66.0	61.5	67.0
	Annual Average (ppm)	N/A	8	8	NM	NM	NM	12	12	12
	Number of Days>Federal 1-hour Std of >100 ppm	0	0	0	NM	NM	NM	97%	97%	N/A

Air Pollutant	Standard/Exceedance	43301 Division Street, Lancaster			923 Poole Street, Mojave			5558 California Avenue, Bakersfield		
		2017	2018	2019	2017	2018	2019	2017	2018	2019
Sulfur Dioxide (SO ₂)	Year Coverage	NM	NM	NM	NM	NM	NM	NM	NM	NM
	Max. 24-hour Concentration (ppm)	NM	NM	NM	NM	NM	NM	NM	NM	NM
	Annual Average (ppm)	NM	NM	NM	NM	NM	NM	NM	NM	NM
	Number of Days>California 24-hour Std of >0.04 ppm	NM	NM	NM	NM	NM	NM	NM	NM	NM
Respirable Particulate Matter (PM ₁₀)	Year Coverage	NM	NM	NM	NM	NM	NM	98%	95%	NM
	Max. 24-hour Concentration (µg/m ³) ³	82.4	89.3	165.0	93.4	93.1	248.0	143.6	142.0	116.0
	Number of Days>Federal 24-hour Std of >150 µg/m ³	0	0	2	0	0	2	0	0	0
	Number of Days>California 24-hour Std of >50 µg/m ³	NM	NM	NM	10	19	N/A	16	13	N/A
	Annual Average ³ (µg/m ³)	26.3	25.2	NA	25.3	26.7	N/A	42.6	42.1	N/A
Fine Particulate Matter (PM _{2.5})	Year Coverage	97%	99%	N/A	95%	94%	N/A	94%	93%	N/A
	Max. 24-hour Concentration (µg/m ³)	26.6	40.4	13.6	26.9	39.0	19.8	101.8	95.8	59.1
	State Annual Average (µg/m ³)	7.3	7.2	N/A	NM	NM	NM	15.9	15.7	N/A
	Number of Days>Federal 24-hour Std of >35 µg/m ³	0	1	0	0	2	0	28	36	N/A
	Annual Average ³ (µg/m ³)	7.2	7.2	6.1	5.5	7.1	6.5	15.6	17.6	11.9

Sources: California Air Resources Board and U.S. Environmental Protection Agency, 2020

¹ CO data for the 923 Poole Street, Mojave, and 5558 California Avenue, Bakersfield, monitoring sites are from the 2000 S Union Avenue, Bakersfield, monitoring site.

² Coverage is for the 8-hour standard.

³ Coverage is for the national standard.

> = greater than

µg/m³ = micrograms per cubic meter

N/A = not available

NM = not monitored

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

ppm = parts per million

Std = standard

4.3 Study Area Emissions

4.3.1 San Joaquin Valley Air Pollution Control District

CARB maintains an annual emission inventory for select counties and air basins in the state. The inventory for the SJVAB comprises of data submitted to CARB by the SJVAPCD plus estimates for certain source categories, which are provided by CARB staff. The 2012 inventory data (the most recent data provided by the CARB) for the SJVAB is summarized in Table 3. Note that Table 3 shows tons per day, while the emissions estimates for the Proposed Action are shown in tons per year.

Table 3 Estimated Annual Average Emissions for the SJVAPCD (tons per day)

Source Category	TOG	ROG	CO	NO _x	SO _x	Particulate Matter	PM ₁₀	PM _{2.5}
Stationary Sources								
Fuel Combustion	18.82	3.60	23.76	29.17	4.30	6.0	5.53	5.31
Waste Disposal	457.38	20.98	0.5	0.29	0.12	0.56	0.15	0.11
Cleaning and Surface Coatings	23.34	20.31	0.01	0.0	0.0	0.1	0.1	0.1
Petroleum Production and Marketing	130.88	33.59	0.61	0.27	0.14	0.23	0.16	0.15
Total Industrial Processes	16.72	15.68	0.83	6.71	3.36	16.54	8.03	3.16
Total Stationary Sources	647.15	94.16	25.70	36.44	7.92	23.44	13.97	8.82
Stationary Sources Percentage of Total	36.7	26.3	2.8	11.2	76.2	4.4	5.0	11.7
Areawide Sources								
Solvent Evaporation	53.11	47.59	--	--	--	--	--	--
Miscellaneous Processes	969.01	128.58	186.76	13.25	1.27	488.35	250.24	59.99
Total Areawide Sources	1,022.12	176.16	186.76	13.25	1.27	488.35	250.24	59.99
Areawide Sources Percentage of Total	57.9	49.2	20.6	4.0	12.2	92.4	88.9	71.4
Mobile Sources								
On-Road Motor Vehicles	53.22	48.51	437.65	177.87	0.67	10.78	10.77	6.73
Other Mobile Sources	41.62	39.02	252.45	97.60	0.53	5.89	6.61	6.09
Total Mobile Sources	94.84	87.53	690.10	275.47	1.20	16.66	17.38	12.81
Mobile Sources Percentage of Total	5.4	24.4	76.5	84.7	11.5	3.2	6.2	16.9
Grand Total	1,764.1	357.9	902.6	325.2	10.4	528.5	281.6	75.6

Source: California Air Resources Board, 2015

CO = carbon monoxide

NO_x = nitrogen oxides

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

ROG = reactive organic gas

SO_x = sulfur oxides

TOG = total organic gas

In the SJVAPCD, mobile source emissions account for over 65 percent of the basin's ROG and NO_x emission inventory. Area sources account for over 90 percent and over 50 percent of the basin's particulate and total VOC emissions, respectively, and stationary sources account for over 75 percent of the basin's sulfur oxide (SO_x) emissions.

4.3.2 Eastern Kern County Air Pollution Control District

Emission inventory data for the EKAPCD for 2012 (the most recent data the CARB provides) is summarized in Table 4. In the EKAPCD, mobile source emissions account for more than 74 percent of the ROG and 56 percent of the NO_x emission inventory. Area sources made up more than 64 percent of the particulate emissions, where stationary sources made up 88 percent of SO_x emissions. Note that Table 4 shows tons per day, whereas the emissions estimates for the Proposed Action are shown in tons per year.

Table 4 Estimated Annual Average Emissions for the EKAPCD (tons per day)

Source Category	TOG	ROG	CO	NO _x	SO _x	Particulate Matter	PM ₁₀	PM _{2.5}
Stationary Sources								
Fuel Combustion	0.52	0.12	0.56	2.46	0.23	0.40	0.37	0.36
Waste Disposal	7.30	0.05	--	--	0.00	0.00	0.00	0.00
Cleaning and Surface Coatings	0.85	0.77	--	--	--	0.00	0.00	0.00
Petroleum Production and Marketing	0.20	0.20	--	--	--	--	--	--
Industrial Processes	0.11	0.09	6.79	15.43	2.25	5.69	3.67	1.55
Total Stationary Sources	8.98	1.22	7.35	17.89	2.48	6.09	4.04	1.91
Stationary Sources Percentage of Total	44	12	13	50	88	23	25	29
Areawide Sources								
Solvent Evaporation	1.14	1.21	--	--	--	--	--	--
Miscellaneous Processes	1.85	0.30	1.37	0.26	0.01	17.09	8.26	1.40
Total Areawide Sources	3.26	1.51	1.37	0.26	0.01	17.09	8.26	1.40
Areawide Sources Percentage of Total	16	14	2	1	0	64	52	21
Mobile Sources								
On-Road Motor Vehicles	2.59	2.37	23.53	9.70	0.03	0.54	0.54	0.35
Other Mobile Sources	5.71	5.48	24.90	7.85	0.31	3.13	3.06	3.02
Total Mobile Sources	8.30	7.85	48.44	17.55	0.34	3.67	3.06	3.37
Mobile Sources Percentage of Total	40	74	85	49	12	14	19	50
Grand Total	20.54	10.59	57.15	35.70	2.83	26.85	15.90	6.68

Source: California Air Resources Board, 2015

CO = carbon dioxide

NO_x = nitrogen oxides

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

ROG = reactive organic gas

SO_x = sulfur oxides

TOG = total organic gas

4.3.3 Antelope Valley Air Quality Monitoring District

Emission inventory data for the AVAQMD for 2012 (the most recent data the CARB provides) is summarized in Table 5. In the AVAQMD, mobile source emissions account for more than 91 percent and 69 percent of the CO and NO_x emission inventory, respectively. Area sources made up more than 55 percent of the particulate emissions, whereas stationary sources made up 45 percent of particulate emissions. Mobile sources were 64 percent of the SO_x emissions. Stationary sources made up 43 percent of the area-wide ROG emissions. Note that Table 5 shows tons per day, whereas the emissions estimates for the Proposed Action are shown in tons per year.

Table 5 Estimated Annual Average Emissions for the AVAQMD (tons per day)

Source Category	TOG	ROG	CO	NO _x	SO _x	Particulate Matter		
						PM ₁₀	PM _{2.5}	
Stationary Sources								
Fuel Combustion	0.36	0.17	1.35	5.09	0.02	3.24	1.36	0.57
Waste Disposal	2.88	0.06	0.00	0.00	0.00	0.54	0.16	0.02
Cleaning and Surface Coatings	5.21	3.36	--	--	--	0.21	0.20	0.19
Petroleum Production and Marketing	13.82	3.11	--	--	--	--	--	--
Industrial Processes	0.19	0.11	0.00	0.01	0.00	17.57	8.46	2.00
Total Stationary Sources	22.46	6.82	1.36	5.09	0.03	21.56	10.81	2.79
Stationary Sources Percentage of Total	63	43	2	28	21	45	43	49
Areawide Sources								
Solvent Evaporation	3.89	3.39	--	--	--	--	--	--
Miscellaneous Processes	3.78	0.74	3.67	0.50	0.02	26.43	13.52	2.28
Total Areawide Sources	7.67	4.13	3.67	0.50	0.02	26.43	13.52	2.28
Areawide Sources Percentage of Total	21	26	6	3	14	55	53	40
Mobile Sources								
On-Road Motor Vehicles	3.19	2.84	41.25	9.54	0.05	--	0.65	0.33
Other Mobile Sources	2.36	2.22	11.57	2.84	0.04	0.32	0.31	0.30
Total Mobile Sources	5.54	5.06	52.81	12.37	0.09	0.32	0.97	0.63
Mobile Sources Percentage of Total	16	32	91	69	64	1	4	11
Grand Total	35.68	16.01	57.84	17.97	0.14	48.31	24.66	5.70

Source: California Air Resources Board, 2015

CO = carbon dioxide

NO_x = nitrogen oxides

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

ROG = reactive organic gas

SO_x = sulfur oxides

TOG = total organic gas

4.4 Action Study Area Designations

The study area defined in the EIR/EIS for the Action and for this Final General Conformity Determination includes the SJVAPCD, EKAPCD, and AVAQMD. Under the federal criteria, the SJVAPCD is currently designated as nonattainment for 8-hour O₃, the 1997 annual PM_{2.5} standard (annual standard of 15 micrograms per cubic meter [$\mu\text{g}/\text{m}^3$]) and 24-hour standard (65 $\mu\text{g}/\text{m}^3$), and the 2006 24-hour PM_{2.5} standard (35 $\mu\text{g}/\text{m}^3$). The SJVAPCD is a maintenance area for PM₁₀, and the Bakersfield urbanized area is a maintenance area for CO. The SJVAPCD is in attainment for the NO₂ and SO₂ NAAQS. The SJVAPCD is unclassified for the lead NAAQS. The EKAPCD is currently designated nonattainment for federal 8-hour O₃. The western portion of the district is currently designated nonattainment for PM₁₀. The EKAPCD is an attainment/unclassifiable area for the PM_{2.5}, CO, and lead NAAQS. The EKAPCD is unclassified for the federal NO₂ and SO₂ standards. Under the federal criteria, the AVAQMD is currently designated as nonattainment for 8-hour O₃. The AVAQMD is an attainment/unclassified area under the NAAQS for CO, NO₂, SO₂, and lead. The AVAQMD is unclassified for the PM₁₀ and PM_{2.5} NAAQS.

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5 RELATIONSHIP TO NEPA

The Final Bakersfield to Palmdale EIR/EIS identifies reasonable foreseeable environmental impacts of the Action, both adverse and beneficial, identifies appropriate measures to mitigate adverse impacts, and identifies the agencies' preferred alternative. The EIR/EIS was prepared to comply with both NEPA and CEQA.

The General Conformity regulations establish certain procedural requirements that must be followed when preparing a General Conformity evaluation and are similar but not identical to those for conducting an air quality impact analysis under NEPA regulations. NEPA requires that the air quality impacts of the proposed Action's implementation be analyzed and disclosed. For purposes of NEPA, the air quality impacts of the Action were determined by identifying the Action's associated incremental emissions and air pollutant concentrations and comparing them, respectively, to emissions thresholds and state and national ambient air quality standards. The air quality impacts of the Action under future Build conditions were also compared in the EIR/EIS to the future No-Build conditions for NEPA purposes (they were also compared to existing conditions). The General Conformity Determination process and general findings are discussed in Sections 3.3.2.1, 3.3.4.5, 3.3.6.3, 3.3.7.1, and 3.3.9.2 of the EIR/EIS.

In order to appropriately identify and offset, where necessary, the emissions resulting from the Bakersfield to Palmdale section of the HSR system, the FRA is issuing this Final General Conformity Determination. The Authority shall enter into agreements with the SJVAPCD (VERA), EKAPCD (Emission Banking Certificate Program), and the AVAQMD (Air Quality Investment Program) to offset emissions, as necessary, resulting from the Bakersfield to Palmdale Section as described in Section 12.2.

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6 AVOIDANCE AND MITIGATION MEASURES TO REDUCE EMISSIONS TO BE INCORPORATED IN THE ACTION

In order to reduce impacts on the environment, the construction of the Action will include impact avoidance and minimization features and mitigation measures that will be implemented as part of the Action to minimize, avoid, and mitigate air quality impacts. These Impact Avoidance and Minimization Features (IAMF) and mitigation measures will be included components of the Action. The IAMFs and mitigation measures required by the ROD will be included in the Mitigation Monitoring and Enforcement Program that will be issued concurrently with the Authority's ROD and that would be enforceable commitments undertaken by the Authority. Construction of the Action is anticipated to occur through a design/build contract. The Authority will include all of the IAMFs and required mitigation measures in the construction contract, which will create a binding and enforceable contractual commitment to implement these design features and mitigation measures.

The Authority will be responsible for implementing and overseeing a mitigation monitoring program to ensure that the contractor meets all air quality IAMFs and mitigation measures.

- **AQ-IAMF#1: Fugitive Dust Emissions**—During construction, the Contractor shall employ the following measures to minimize and control fugitive dust emissions. The Contractor shall prepare a fugitive dust control plan for each distinct construction segment. At a minimum, the plan shall describe how each measure would be employed and identify an individual responsible for ensuring implementation. At a minimum, the plan shall address the following components unless alternative measures are approved by the applicable air quality management district.
 - Cover all vehicle loads transported on public roads to limit visible dust emissions, and maintain at least 6 inches of freeboard space from the top of the container or truck bed.
 - Clean all trucks and equipment before exiting the construction site using an appropriate cleaning station that does not allow runoff to leave the site or mud to be carried on tires off the site.
 - Water exposed surfaces and unpaved roads at a minimum three times daily with adequate volume to result in wetting of the top 1 inch of soil but avoiding overland flow. Rain events may result in adequate wetting of top 1 inch of soil thereby alleviating the need to manually apply water.
 - Limit vehicle travel speed on unpaved roads to 15 miles per hour (mph).
 - Suspend any dust-generating activities when average wind speed exceeds 25 mph.
 - Stabilize all disturbed areas, including storage piles that are not being used on a daily basis for construction purposes, by using water, a chemical stabilizer/suppressant, hydro mulch or by covering with a tarp or other suitable cover or vegetative ground cover, to control fugitive dust emissions effectively. In areas adjacent to organic farms, the Authority would use non-chemical means of dust suppression.
 - Stabilize all on-site unpaved roads and off-site unpaved access roads, using water or a chemical stabilizer/suppressant, to effectively control fugitive dust emissions. In areas adjacent to organic farms, the Authority would use non-chemical means of dust suppression.
 - Carry out watering or presoaking for all land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities.
 - For buildings up to 6 stories in height, wet all exterior surfaces of buildings during demolition.
 - Limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at a minimum of once daily, using a vacuum type sweeper.

- After the addition of materials to or the removal of materials from surface or outdoor storage piles, apply sufficient water or a chemical stabilizer/suppressant.
- **AQ-IAMF#2: Selection of Coatings**—During construction, the Contractor shall use:
 - Low-volatile organic compound (VOC) paint that contains less than 10 percent of VOC contents (VOC, 10%).
 - Super-compliant or Clean Air paint that has a lower VOC content than that required by San Joaquin Valley Unified Air Pollution Control District Rule 4601, Eastern Kern Air Pollution Control District Rule 410, and Antelope Valley Air Quality Management District Rule 1113, when available. If not available, the Contractor shall document the lack of availability; recommend alternative measure(s) to comply with by San Joaquin Valley Unified Air Pollution Control District Rule 4601, Eastern Kern Air Pollution Control District Rule 410, and Antelope Valley Air Quality Management District Rule 1113; or disclose absence of measure(s) for full compliance and obtain concurrence from the Authority.
- **AQ-IAMF#3: Renewable Diesel**—During construction, the Contractor would use renewable diesel fuel to minimize and control exhaust emissions from all heavy-duty diesel-fueled construction diesel equipment and on-road diesel trucks. Renewable diesel must meet the most recent ASTM D975 specification for Ultra Low Sulfur Diesel and have a carbon intensity no greater than 50% of diesel with the lowest carbon intensity among petroleum fuels sold in California. The Contractor would provide the Authority with monthly and annual reports, through the Environmental Mitigation Management and Application (EMMA) system, of renewable diesel purchase records and equipment and vehicle fuel consumption. Exemptions to use traditional diesel can be made where renewable diesel is not available from suppliers within 200 miles of the project site. The construction contract must identify the quantity of traditional diesel purchased and fully document the availability and price of renewable diesel to meet project demand.
- **AQ-IAMF#4: Reduce Criteria Exhaust Emissions from Construction Equipment**—Prior to issuance of construction contracts, the Authority would incorporate the following construction equipment exhaust emissions requirements into the contract specifications:
 1. All heavy-duty off-road construction diesel equipment used during the construction phase would meet Tier 4 engine requirements.
 2. A copy of each unit's certified tier specification and any required CARB or air pollution control district operating permit would be made available to the Authority at the time of mobilization of each piece of equipment.
 3. The contractor would keep a written record (supported by equipment-hour meters where available) of equipment usage during project construction for each piece of equipment.
 4. The contractor would provide the Authority with monthly reports of equipment operating hours (through the Environmental Mitigation Management and Assessment [EMMA] system) and annual reports documenting compliance.
- **AQ-IAMF#5: Reduce Criteria Exhaust Emissions from ON-Road Construction Equipment**—Prior to issuance of construction contracts, the Authority would incorporate the following material-hauling truck fleet mix requirements into the contract specifications:
 1. All on-road trucks used to haul construction materials, including fill, ballast, rail ties, and steel, would consist of a fleet mix of equipment model year 2010 or newer, but no less than the average fleet mix for the current calendar year as set forth in the CARB's EMFAC 2014 database.
 2. The contractor would provide documentation to the Authority of efforts to secure such a fleet mix.

3. The contractor would keep a written record of equipment usage during project construction for each piece of equipment and provide the Authority with monthly reports of VMT (through EMMA) and annual reports documenting compliance.
- **AQ-IAMF#6: Reduce the Potential Impact of Concrete Batch Plants**—Prior to construction of any concrete batch plant, the contractor would provide the Authority with a technical memorandum documenting consistency with the Authority's concrete batch plant siting criteria and utilization of typical control measures. Concrete batch plants would be sited at least 1,000 feet from sensitive receptors, including places such as daycare centers, hospitals, senior care facilities, residences, parks, and other areas where people may congregate. The concrete batch plant would implement typical control measures to reduce fugitive dust such as water sprays, enclosures, hoods, curtains, shrouds, movable and telescoping chutes, central dust collection systems, and other suitable technology, to reduce emissions to be equivalent to the USEPA AP-42 controlled emission factors for concrete batch plants. The contractor would provide to the Authority documentation that each batch plant meets this standard during operation.
 - **AQ-MM#1: Offset Project Construction Emissions through Off-Site Emission Reduction Programs**—The Authority and SJVAPCD have entered into a contractual agreement to mitigate (by offsetting) to net zero the project's actual emissions from construction equipment and vehicle exhaust emissions of volatile organic compound (VOC), NO_x, particulate matter (PM₁₀), and PM_{2.5}. The agreement will provide funds for the SJVAPCD's Emission Reduction Incentive Program [1] (SJVAPCD 2011) to fund grants for projects that achieve emission reductions, with preference given to highly affected communities, thus offsetting project-related impacts on air quality. To lower overall cost, funding for the VERA program to cover estimated construction emissions for any funded construction phase will be provided at the beginning of the construction phase. At a minimum, mitigation/offsets will occur in the year of impact, or as otherwise permitted by 40 Code of Federal Regulations (C.F.R.) Part 93 Section 93.163.

The Authority shall also enter into an agreement with the Antelope Valley Air Quality Management District (AVAQMD) and Eastern Kern Air Pollution Control District (EKAPCD) to mitigate (by offsetting) to net zero the project's actual emissions from construction equipment and vehicle exhaust emissions of VOC, NO_x, PM₁₀ and PM_{2.5}. In the AVAQMD, the Authority shall participate in the Air Quality Investment Program, which funds stationary- and mobile-source emission reduction strategies. In the EKAPCD, the Authority shall provide an application for the Emission Banking Certificate Program.

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7 REGULATORY PROCEDURES

The General Conformity regulations establish certain procedural requirements that must be followed when preparing a General Conformity evaluation. This section addresses the major applicable procedural issues and specifies how these requirements are met for the evaluation of the Federal Action. The procedures required for the General Conformity evaluation are similar but not identical to those for conducting an air quality impact analysis pursuant to NEPA regulations. It is anticipated, however, that the Final General Conformity Determination will be published concurrent with the Authority's ROD for the Federal Action. This Final General Conformity Determination is being released for public and agency review pursuant to 40 C.F.R. § 93.156.

The Authority identified the appropriate emission estimation techniques and planning assumptions in close consultation with the state entities charged with regulating air pollution in the SJVAB and MDAB.

7.1 Use of Latest Planning Assumptions

The General Conformity regulations require the use of the latest planning assumptions for the area encompassing the Federal Action, derived from the estimates of population, employment, travel, and congestion most recently approved by the area's metropolitan planning organization (MPO) (40 C.F.R. § 93.159(a)).

The traffic data used in the air quality analysis (see EIR/EIS, Section 3.2) are consistent with the most recent estimates made by the MPOs for traffic volume growth rates, including forecast changes in vehicle miles traveled (VMT) and vehicle hours traveled (VHT). The Authority developed these estimates based on the MPO's traffic assignment models using the baseline and future population, employment, and travel and congestion information available at the time the analysis was prepared. These assumptions are consistent with those in the current conformity determinations for the region's Transportation Plan and TIP.

7.2 Use of Latest Emission Estimation Techniques

The General Conformity regulations require the use of the latest and most accurate emission estimation techniques available, unless such techniques are inappropriate (40 C.F.R. § 93.159(b)). Operational phase vehicular emission factors were estimated by using the CARB emission factor program, Emission FACTors 2014 (EMFAC2014). Parameters were set in EMFAC2014 for each individual county to reflect conditions within each county, and statewide parameters were used to reflect statewide conditions. Operational phase aircraft emissions were estimated using the Federal Aviation Administration's Aviation Environmental Design Tool. In addition, electrical demands caused by propulsion of the trains, and of the trains at terminal stations and in storage depots and maintenance facilities were estimated using average emission factors for each kilowatt-hour required from CARB statewide emission inventories of electrical and cogeneration facilities data along with USEPA eGRID2012 (released October 20, 2015) electrical generation data. The energy estimates used for the propulsion of the HSR system include the use of regenerative braking power. Operation of the Bakersfield to Palmdale Project Section HSR stations and the LMF and co-located MOWF were determined using the California Emissions Estimator Model (CalEEMod).

Emissions from regional building demolition and construction of the at-grade rail segments, elevated rail segments, retained-fill rail segments, electrical substations, train stations, LMF/MOWF, and roadways and roadway overpasses were calculated using emission factors from CalEEMod. CalEEMod uses emission factors from the OFFROAD 2011 model. The OFFROAD 2011 model provides the latest emission factors for off-road construction equipment and accounts for lower fleet population and growth factors as a result of the economic recession and updated load factors based on feedback from engine manufacturers. The use of emission rates from the OFFROAD models reflects the recommendation of CARB to capture the latest off-road construction assumptions. OFFROAD 2011 default load factors (the ratio of average equipment horsepower utilized to maximum equipment horsepower) and useful life parameters

were used for emission estimates. Mobile-source emission burdens from worker vehicle trips and truck trips were also calculated using CalEEMod.

Construction exhaust emissions from equipment, fugitive dust emissions from earthmoving activities, and emissions from worker vehicle trips, deliveries, and material hauling were calculated and compiled in CalEEMod for each year of construction.

Action-specific data, including construction equipment lists and the construction schedule, were used for construction associated with the alignment/guideway. Action-specific data were not available for the nonlinear construction associated with the stations and LMF/MOWF buildings. Therefore, the CalEEMod default settings were used in these instances only.

Mobile-source emission burdens from worker trips and truck trips were estimated using CalEEMod.

7.3 Major Construction-Phase Activities

Action-specific data, including construction equipment lists and the construction schedule, were used for construction associated with the alignment/guideway. Calculations were performed for each year of construction.

Major activities were grouped into the following categories (described in more detail in Section 9.0 of this report):

- Mobilization
- Site preparation including demolition, land clearing, and grubbing
- Earthmoving
- Roadway crossings
- Elevated structures
- Track laying – elevated, at-grade, and retained fill
- Traction power supply station
- Switching station
- Paralleling station
- LMF/MOWF
- Bakersfield Station
- Palmdale Station
- Hauling emissions, including truck and rail
- Demobilization

7.4 Emission Scenarios

The General Conformity regulations require that the evaluation reflect certain emission scenarios (40 C.F.R. §93.159(d)). Specifically, these scenarios generally include the evaluation of the direct and indirect emissions from a proposed Action for the following years: (1) for nonattainment areas, the attainment year specified in the SIP or if the SIP does not specify an attainment year, the latest attainment year possible under the CAA, and for maintenance areas, the farthest year for which emissions are projected in the approved maintenance plan; (2) the year during which the total of direct and indirect emissions for the Federal Action are projected to be the greatest on an annual basis; and (3) any year for which the applicable SIP specifies an emissions budget. Both the operational and construction phases of the Action have to be analyzed, and the following applies to the proposed Action.

Emissions generated during the operational phase of the HSR would meet the emission requirements for the years associated with Items 1 and 3 because the emissions generated during the operational phase of the proposed Action would be less than those emitted in the No-Build scenario. In addition, microscale analyses conducted for the EIR/EIS demonstrate that the operational phase of the HSR would not cause or exacerbate a violation of the NAAQS for all applicable pollutants. The microscale CO modeling results for 2016 and 2040 are presented in the *Bakersfield to Palmdale Project Section Final Air Quality and Global Climate Change*

Technical Report (Authority 2018b). Bakersfield Station data are included in the *Fresno to Bakersfield Section Final EIR/EIS* (Authority and FRA 2014) and technical reports.

- Emissions generated during HSR's construction phase, which would include the year with the greatest amount of total direct and indirect emissions, may be subject to General Conformity regulations because regional emissions would increase and, as such, have the potential to cause or exacerbate an exceedance of an NAAQS. Therefore, analyses were conducted to estimate the amounts of emissions that would be generated during the construction phase (for comparison with the General Conformity applicability rates) and the potential impacts of these emissions on local air quality levels. Emissions generated at the construction sites (e.g., tailpipe emissions from the on-site heavy-duty diesel equipment and fugitive dust emissions generated by vehicles traveling within the construction sites) and on the area's roadways by vehicles traveling to and from these sites (by vehicles transporting materials and the workers traveling to and from work) were considered.
- Air quality dispersion modeling would be required for this conformity analysis to estimate the Action's localized impacts on PM_{2.5} and CO concentrations if the annual emissions of the pollutants generated during construction were to exceed the General Conformity *de minimis* thresholds.

Annual emissions were estimated for each year of the proposed Action's construction period. These emissions, which are the maximum values for the Action, are described in more detail in Section 10.0 of this report.

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8 APPLICABILITY ANALYSIS

The first step in a General Conformity evaluation is an analysis of whether the requirements apply to a proposed federal action in a nonattainment or a maintenance area. Unless exempted by the regulations or otherwise presumed to conform, a federal (non-Transportation) action requires a General Conformity Determination for each pollutant where the total of direct and indirect emissions caused by the federal action would equal or exceed an annual *de minimis* emission rate.

8.1 Attainment Status of Action Area

USEPA and CARB designate each county (or portions of counties) within California as attainment, maintenance, or nonattainment based on the area's ability to meet ambient air quality standards. Regions are designated as attainment for a criteria pollutant when the concentration of that pollutant is below the ambient air standard. If a criteria pollutant concentration is above the ambient air standard, the area is in nonattainment for that pollutant. Areas previously designated as nonattainment that subsequently demonstrated compliance with the ambient air quality standards are designated as a maintenance area. Table 6 summarizes the federal (under NAAQS) and state (under CAAQS) attainment status for each of the air basins for which the Action would be located.

8.1.1 Attainment Status: San Joaquin Valley Air Basin

Under the federal criteria, the SJVAPCD is currently designated as nonattainment for 8-hour O₃, the 1997 annual PM_{2.5} standard (annual standard of 15 micrograms per cubic meter [µg/m³]) and 24-hour standard (65 µg/m³), and the 2006 24-hour PM_{2.5} standard (35 µg/m³). The SJVAPCD is a maintenance area for PM₁₀, and the Bakersfield urbanized area is a maintenance area for CO. The SJVAPCD is in attainment for the NO₂ and SO₂ NAAQS. The SJVAB is unclassified for the lead NAAQS.

Under the state criteria, the SJVAPCD is currently designated as nonattainment for 1-hour O₃, 8-hour O₃, PM₁₀, and PM_{2.5}. The SJVAPCD is an attainment/unclassified area for the state CO standard and an attainment area for the state NO₂, SO₂, and lead standards. The SJVAPCD is an unclassified area for the state hydrogen sulfide standard and visibility-reducing particle standard, and is classified as an attainment area for sulfates and vinyl chloride (SJVAPCD 2013a).

8.1.2 Attainment Status: Antelope Valley Air Quality Management District

Under the federal criteria, the AVAQMD is currently designated as nonattainment for 8-hour O₃. The AVAQMD is an attainment/unclassified area under the NAAQS for CO, NO₂, SO₂, and lead. The AVAQMD is unclassified for the PM₁₀ and PM_{2.5} NAAQS.

Under the state criteria, the AVAQMD is currently designated as nonattainment for O₃ (classified as extreme nonattainment) and PM₁₀. The AVAQMD is an attainment/unclassified area for state PM_{2.5}, CO, NO₂, SO₂, and lead standards. The AVAQMD is an unclassified area for the state hydrogen sulfide standard, visibility-reducing particle standard, and particulate sulfate standard (AVAQMD 2014).

8.1.3 Attainment Status: Eastern Kern Air Pollution Control District

The EKAPCD is currently designated nonattainment for federal 8-hour O₃. The western portion of the district is currently designated nonattainment for PM₁₀. The EKAPCD is an attainment/unclassifiable area for the PM_{2.5}, CO, and lead NAAQS. The EKAPCD is unclassified for the federal NO₂ and SO₂ standards.

Under the state criteria, the EKAPCD is currently designated as nonattainment for 1-hour O₃, 8-hour O₃, and PM₁₀. The EKAPCD is in attainment for the state NO₂, SO₂, and lead standards, and is an unclassified area for the PM_{2.5} and CO state standards (EKAPCD 2012).

Table 6 Federal and State Attainment Status

Pollutants	Federal Classification	State Classification
San Joaquin Valley Air Pollution Control District		
O ₃ : 1-Hour	No Federal Standard	Nonattainment (Severe)
O ₃ : 8-Hour	Nonattainment (Extreme)	Nonattainment
PM ₁₀	Attainment/Maintenance	Nonattainment
PM _{2.5}	Nonattainment	Nonattainment
CO	Urban portion of Fresno County and Kern County: Maintenance Remaining basin: Attainment	Attainment/Unclassified
NO ₂	Attainment/Unclassified	Attainment
SO ₂	Attainment/Unclassified	Attainment
Lead	No Designation/Classification	Attainment
Antelope Valley Air Quality Management District		
O ₃ : 1-Hour	No Federal Standard	Nonattainment (Extreme)
O ₃ : 8-Hour	Nonattainment (Severe)	Nonattainment (Extreme)
PM ₁₀	Attainment/Unclassified	Nonattainment
PM _{2.5}	Attainment/Unclassified	Unclassified
CO	Attainment	Attainment
NO ₂	Attainment/Unclassified	Attainment/Unclassified
SO ₂	Attainment/Unclassified	Attainment/Unclassified
Lead	Attainment	Attainment
Eastern Kern Air Pollution Control District		
O ₃ : 1-Hour	No Federal Standard	Moderate Nonattainment
O ₃ : 8-Hour	Nonattainment	Nonattainment
PM ₁₀	Attainment/Unclassified (EKAPCD) Nonattainment (Kern River/Cummings Valleys), Attainment Maintenance (Indian Wells Valley)	Nonattainment
PM _{2.5}	Attainment/Unclassified	Unclassified
CO	Attainment/Unclassified	Unclassified
NO ₂	Unclassified	Attainment
SO ₂	Unclassified	Attainment
Lead	Attainment/Unclassified	Attainment

Sources: U.S. Environmental Protection Agency, 2013; San Joaquin Valley Air Pollution Control District, 2013a; Antelope Valley Air Quality Management District, 2016; Eastern Kern Air Pollution Control District, 2012c

CO = carbon monoxide

EKAPCD = Eastern Kern Air Pollution Control District

NO_x = nitrogen oxides

O₃ = ozone

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

SO₂ = sulfur dioxide

9 CONSTRUCTION ACTIVITIES CONSIDERED

As shown in Section 3.3.6.3 of the EIR/EIS, the results of the regional analyses conducted for the proposed Action demonstrate that emissions generated during the operational phase would be less than those emitted in the No-Build and existing conditions scenarios and that the microscale analyses demonstrate that the Action would not cause or exacerbate a violation of the NAAQS for these pollutants. As such, no further analysis of the operational period emissions is necessary for this General Conformity determination. Section 9.0 will focus on the emissions generated from the construction period emissions for the Bakersfield to Palmdale Project.

The analysis conducted for the EIR/EIS to estimate potential air quality impacts caused by on-site (e.g., demolition activities, construction equipment operations, and truck movements) and off-site (e.g., motor vehicle traffic effects due to truck trips) construction-phase activities included the following:

- Estimation of emissions generated by the construction activities (e.g., deconstruction, concrete and steel construction), including fugitive dust emissions and emissions released from diesel-powered equipment and trucks based on the hours of operation of each piece of equipment;
- Identification of heavily traveled truck routes to estimate the cumulative effects of on-site construction activity emissions and off-site traffic emissions;
- An on-site dispersion modeling analysis of the major construction areas;
- An off-site dispersion modeling analysis of the roadway intersections/interchanges adjacent to the construction areas using traffic data that include construction-related vehicles and background traffic; and
- A comparison of the on-site and off-site modeling results to the applicable NAAQS for the applicable pollutants.

Emission rates for these activities were estimated based on the following:

- The number of hours per day and duration of each construction activity;
- The number and type of construction equipment to be used;
- Horsepower (HP) and utilization rates (hours per day) for each piece of equipment;
- The quantities of construction/demolition material produced and removed from each site; and
- The number of truck trips needed to remove construction/demolition material, and to bring the supply materials to each site.

The following is a discussion of the major activities considered, the timing of these activities, and the procedures used to estimate emission rates.

A full description of construction analysis methodology can be found in Section 6.9 of the *Bakersfield to Palmdale Section Air Quality and Global Climate Change Technical Report* for this Action (Authority 2018b).

Construction activities associated with proposed Action would result in criteria pollutant and greenhouse gas (GHG) emissions. Construction emissions for the proposed Action are quantified and analyzed in Section 3.3.6.3 of the EIR/EIS. The analysis assumed that project construction would occur from 2018 to 2026. The construction schedule has since been revised. See Section 2.8 in Chapter 2 of the EIR/EIS for additional details on the revised construction schedule. Although the schedule has been updated, the analysis is still valid as the equipment quantities and annual emission rates would remain unchanged. While separate projects for purposes of planning the HSR system, construction of the Bakersfield to Palmdale Section would overlap with the construction period for the Merced to Fresno Project Section and Fresno to Bakersfield Project Section, thereby adding to the cumulative air quality impacts within the SJVAB. In addition, construction of the Bakersfield to Palmdale Project Section would overlap with the

construction period for the Palmdale to Burbank Project Section, thereby adding to the cumulative air quality impacts within the MDAB. The cumulative emissions that could result from potential concurrent construction activities are presented in Section 13 of the General Conformity Report.

9.1 Site Preparation

9.1.1 Demolition

This analysis assumed that demolition of existing structures along the HSR alignment and near HSR stations would take place from December 2020 through August 2021. Demolition emissions were calculated with CalEEMod using the project-specific equipment list. In addition to the fugitive dust emissions resulting from the destruction of existing buildings, emissions were estimated for worker trips, construction equipment exhaust, and truck-hauling exhaust.

9.1.2 Land Grubbing

Land grubbing refers to the site preparation activities for HSR alignment construction. Emissions from land grubbing were estimated using the OFFROAD 2011 emission factors as well as a site-specific equipment list. This analysis assumed that land grubbing would take place at four staging areas from December 2020 to August 2021. Fugitive dust from land-grubbing activities includes that from worker trips, construction equipment exhaust, and truck-hauling exhaust.

9.2 Earth Moving

The earthmoving activities include grading, trenching, and cut/fill activities for the HSR alignment construction. This analysis assumed that earthmoving would occur at four locations from March 2018 to October 2020. The emissions associated with the earthmoving activities were estimated using CalEEMod with OFFROAD 2011 emission factors, in conjunction with the site-specific equipment list. Fugitive dust from land-grubbing activities includes that from worker trips, construction equipment exhaust, and truck-hauling exhaust.

The construction area used in CalEEMod was the total area to be cleared based on the length of the alignment. Although the track widths vary along the alignment, it was conservatively assumed that a width of 120 feet would be graded along the entire length of the alignment. This width accounts for the widest portion of the alignment (four tracks wide) plus a buffer on each side.

Earthwork is the disturbance of soil or earth by any means, including excavation (including subsurface), tunneling, drilling, infilling, stockpiling, dumping of soil or sand, and construction/reconstruction of any track, embankment, or drainage channel. Earthwork would be performed in such a manner as to achieve a balanced condition where the quantity of soil or earthen materials removed through excavation would be roughly equal to the quantity of material being placed in embankments. The adjustment of the ratio of excavation to embankment to achieve this balance would be performed by variations in cut-slope ratios, embankment widths, and embankment slope ratios during construction as existing ground conditions are revealed. It is intended that cut material and tunnel spoils would be stored and processed on-site and used as fill materials if deemed suitable by the site geotechnical engineer. It is not anticipated that any excavated materials would need to be exported to off-site locations for the B-P Build Alternatives.

9.3 HSR Alignment Construction

This analysis assumed that the HSR alignment construction would occur from 2020 to 2026, and includes the following construction phases and operation of a concrete batch plant:

- Constructing structures for the elevated rail
- Laying elevated rail and at-grade rail
- Constructing the retaining wall for the retained-fill rail
- Laying retained-fill rail

9.3.1 Rail Type and Alignment Alternatives

The four B-P Build Alternatives differ in total length, location, width, and percentage of at-grade/elevated/retained fill. Table 3.3-5 of the EIR/EIS summarizes the total length of at-grade rail, elevated rail, and retained-fill rail for each B-P Build Alternative. The CCNM Design Option would add 124 feet to the length of each B-P Build Alternative and the Refined CCNM Design Option would add 2,006 feet to the length of each B-P Build Alternative. Due to rounding, the total length in miles would not change with the CCNM Design Option. Emissions from construction of the track were determined using CalEEMod. Equipment counts, horsepower, hours of operation, and load factors used in CalEEMod are included in the *Bakersfield to Palmdale Project Section Air Quality and Global Climate Change Technical Report* (Authority 2018b).

9.3.2 Concrete Batch Plants

Concrete would be required for the construction of bridges used to support the elevated sections of the HSR alignment, for construction of the station platform, and for construction of the retaining wall used to support the retained-fill sections of the alignment. To provide enough concrete on-site, it is estimated that batch plants would operate in the Action vicinity (i.e., within 0.5 mile) during construction of the Action. Because the locations of the concrete batch plants are unknown, fugitive dust emissions associated with the plants were estimated based on the total amount of concrete required and on emission factors from Chapter 11.12 of AP-42 (USEPA 2006). Emissions from on-road truck trips associated with transporting material to and from the concrete batch plants were included in materials-hauling emissions calculations.

9.3.3 Material Hauling

Emissions from the exhaust of trucks used to haul materials (including concrete slabs) to the construction site were calculated using heavy-duty truck emission factors from EMFAC2014 and anticipated travel distances of haul trucks within the SJVAB and MDAB. Ballast materials could potentially be hauled by rail within the air basins. Locomotive emission factors from *Emission Factors for Locomotives* (USEPA 2009b) and the travel distance by rail to the Action site were used to estimate rail emissions.

Based on active permitted quarry locations, ballast materials are expected to be available within the SJVAB and MDAB (California Department of Conservation 2016). Therefore, for the regional emission analysis, emissions from ballast materials-hauling were calculated using the distance traveled within the Action air districts. Emissions from ballast materials hauling by trucks and locomotives outside the Action air districts were estimated based on the travel distances and transportation method (by rail or by truck) from the locations where ballast materials would be available. Rail emission factors using the USEPA guidance (USEPA 2009b) were used to estimate the locomotive emissions. Construction materials would likely be delivered from supply facilities within the SJVAB and the MDAB.

9.4 Train Station Construction

Emissions from HSR station construction would be the result of mass site grading, building construction, and architectural coatings. Where applicable, emissions resulting from worker trips, vendor trips, and construction equipment exhaust were included. Paving activities associated with surface parking lots were included. For the purposes of this analysis, it was assumed that construction of the Palmdale Station would begin in 2018² and be completed by 2021. CalEEMod was used to estimate emissions from construction phases of the Palmdale Station.

² This schedule is presented for analysis purposes only; the resulting data remains valid because the equipment quantities and annual emission rates would remain unchanged.

9.5 Maintenance Facilities Construction

Emissions associated with construction of the LMF and MOWF are expected as a result of mass site grading, asphalt paving, building construction, and architectural coatings. These activities would occur during maintenance activities.

Fugitive dust from construction of the maintenance-of-way facility includes that from worker trips, construction equipment exhaust, and truck-hauling exhaust. Emissions from track construction were estimated using CalEEMod.

9.6 Roadway Crossing Construction

The B-P Build Alternatives would include the relocation and expansion of freeway segments, local roads, and overpasses, as well as reconstruction of several intersections. Fugitive dust and exhaust emissions from these construction activities were estimated using the Sacramento Metropolitan Air Quality Management District's Road Construction Emissions Model. Roadway demolition emissions are included in the CalEEMod analysis using the Action-specific equipment list.

For purposes of this analysis, it was assumed that roadway Action construction would begin in January 2020³ and be completed by June 2022 (a total of 28 months), and that each type of roadway Action would be constructed independently at staggered intervals during the 28-month period.

Based on Action-specific data, a simplified construction schedule was used to estimate construction emissions. The representative Action roadway length for each scenario was estimated by averaging all anticipated Action roadway lengths within that designated scenario.

³ This schedule is presented for analysis purposes only; the resulting data remains valid because the equipment quantities and annual emission rates would remain unchanged.

10 ESTIMATED EMISSIONS RATES AND COMPARISON TO DE MINIMIS THRESHOLDS – BAKERSFIELD-PALMDALE

Construction activities associated with the HSR alternatives would result in criteria pollutant emissions. Construction emissions for the four Bakersfield to Palmdale alternatives are quantified and analyzed in this section.

10.1 Construction Impacts within the SJVAPCD

Total annual estimated emissions generated within the SJVAPCD during the proposed Action’s construction period, as presented in the HSR EIR/EIS, are provided in Table 7. As shown in the table, direct emissions from the construction phase of the Bakersfield to Palmdale Project Section within the SJVAPCD would exceed the GC applicability thresholds for VOC and NO_x in certain calendar years in which construction would take place. The maximum estimated annual values of each pollutant, by non-attainment or maintenance area, and the percentage of the 2012 estimated emission rates in the SJVAPCD (see Table 3) for the Bakersfield to Palmdale construction are as follows:

- NO_x: 177 tons per year (tpy)(0.15%)
- VOCs: 17 tpy (0.01%)
- PM_{2.5}: 9 tpy (0.03%)
- PM₁₀: 15 tpy (0.02%)
- CO: 90 tpy (0.03%)

Table 7 Estimated Annual Average Emissions for the SJVAPCD

Pollutants	Emissions (Tons/Year)											Conformity Applicability Thresholds (tons/year)
	2018	2019	2020	2021	2022	2022 with Refined CCNM Option	2023	2023 with Refined CCNM Option	2024	2025	2026	
Alternative 1												
NO _x	55*	2	104*	156*	133*	142*	107*	110*	51*	25*	15*	10
VOCs	5	1	11*	16*	14*	14*	11*	11*	7	4	2	10
PM _{2.5}	3	1	5	8	7	7	6	6	3	2	1	100
PM ₁₀	4	1	7	13	12	12	11	11	6	2	1	100
CO ¹	7	1	25	69	68	68	60	60	12	5	3	100
Alternative 2												
NO _x	0	0	134*	151*	121*	136*	76*	78*	31*	15*	15*	10
VOCs	0	0	13*	15*	13*	13*	8	8	4	2	2	10
PM _{2.5}	0	0	6	8	8	8	5	5	2	1	1	100
PM ₁₀	0	0	10	15	13	13	10	10	6	1	1	100
CO ¹	0	0	29	86	83	84	48	48	7	3	3	100
Alternative 3												
NO _x	0	0	145*	168*	151*	160*	84*	87*	51*	15*	15*	10
VOCs	0	0	15*	17*	16*	16*	9	9	7	2	2	10
PM _{2.5}	0	0	6	9	8	8	4	4	3	1	1	100
PM ₁₀	0	0	8	11	11	11	6	6	4	1	1	100
CO ¹	0	0	31	90	89	89	22	22	12	3	3	100

Pollutants	Emissions (Tons/Year)											Conformity Applicability Thresholds (tons/year)
	2018	2019	2020	2021	2022	2022 with Refined CCNM Option	2023	2023 with Refined CCNM Option	2024	2025	2026	
Alternative 5												
NO _x	0	0	155*	177*	161*	170*	128*	131*	50*	32*	13*	10
VOCs	0	0	15*	17*	16*	16*	13*	13*	6	5	2	10
PM _{2.5}	0	0	7	9	8	8	7	7	3	2	1	100
PM ₁₀	0	0	10	11	11	11	9	9	4	2	1	100
CO ¹	0	0	42	90	90	90	85	85	12	7	3	100

Source: California High-Speed Rail Authority, 2020

Values marked with an asterisk (*) exceed applicability thresholds

¹ Bakersfield urbanized maintenance area only

² The emissions presented in this table reflect the impact of the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule, per the California Air Resource Board's "EMFAC Off-Model Adjustment Factors to Account for the SAFE Vehicles Rule Part One" issued on November 20, 2019. https://ww3.arb.ca.gov/msei/emfac_off_model_adjustment_factors_final_Final.pdf.

CCNM = César E. Chávez National Monument

CO = carbon monoxide

NO_x = nitrogen oxide

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

VOC = volatile organic compound

10.2 Construction Impacts within the EKAPCD

Total annual estimated emissions generated within the EKAPCD during the proposed Action's construction period, as presented in the HSR EIR/EIS, are provided in Table 8. As shown in the table, construction emissions for Bakersfield to Palmdale Project Section within the EKAPCD would exceed the GC applicability thresholds for NO_x in some construction years. The maximum estimated annual values of each pollutant, by non-attainment or maintenance area, and the percentage of the 2012 estimated emission rates in the EKAPCD (see Table 4) for the Bakersfield to Palmdale construction are as follows:

- NO_x: 279 tpy (2.14%)
- VOCs: 27 tpy (0.70%)
- PM_{2.5}: 14 tpy (0.57%)
- PM₁₀: 22 tpy (0.38%)
- CO: 540 tpy (2.591%)

Table 8 Estimated Annual Average Emissions for the EKAPCD

Pollutants	Emissions (Tons/Year)											Conformity Applicability Thresholds (tons/year)
	2018	2019	2020	2021	2022	2022 with Refined CCNM Option	2023	2022 with Refined CCNM Option	2024	2025	2026	
Alternative 1												
NO _x	33	60*	172*	207*	177*	213*	121*	131*	56*	32	20	50
VOCs	3	6	17	20	18	18	15	16	7	5	3	50
PM _{2.5}	2	3	8	11	10	10	9	9	3	2	1	N/A
PM ₁₀	4	5	13	18	16	16	15	15	7	2	1	70

Pollutants	Emissions (Tons/Year)											Conformity Applicability Thresholds (tons/year)
	2018	2019	2020	2021	2022	2022 with Refined CCNM Option	2023	2022 with Refined CCNM Option	2024	2025	2026	
CO	18	35	161	392	381	384	346	346	155	29	17	N/A
Alternative 2												
NO _x	0	0	152*	254*	185*	222*	114*	124*	33	20	20	50
VOCs	0	0	15	25	19	19	12	12	4	2	2	50
PM _{2.5}	0	0	7	13	10	10	7	7	3	1	1	N/A
PM ₁₀	0	0	14	22	18	18	14	14	7	1	1	70
CO	0	0	149	521	486	489	287	288	33	16	16	N/A
Alternative 3												
NO _x	0	0	184*	277*	233*	269*	132*	142*	57*	20	20	50
VOCs	0	0	17	27	24	24	13	13	7	3	2	50
PM _{2.5}	0	0	7	13	12	12	7	7	3	1	1	N/A
PM ₁₀	0	0	10	17	16	16	10	10	5	1	1	70
CO	0	0	161	534	521	524	137	138	57	17	17	N/A
Alternative 5												
NO _x	0	0	187*	279*	232*	268*	183*	193*	54*	41	17	50
VOCs	0	0	18	27	24	24	19	19	7	6	2	50
PM _{2.5}	0	0	9	14	12	12	10	10	3	3	1	N/A
PM ₁₀	0	0	12	18	15	15	12	12	4	3	1	70
CO	0	0	127	540	522	525	491	492	54	37	14	N/A

Source: California High-Speed Rail Authority, 2020

Values marked with an asterisk (*) exceed applicability thresholds

¹ The emissions presented in this table reflect the impact of the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule, per the California Air Resource Board's "EMFAC Off-Model Adjustment Factors to Account for the SAFE Vehicles Rule Part One" issued on November 20, 2019. https://ww3.arb.ca.gov/msei/emfac_off_model_adjustment_factors_final_Final.pdf.

CCNM = César E. Chávez National Monument

CO = carbon monoxide

NO_x = nitrogen oxide

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

VOC = volatile organic compound

10.3 Construction Impacts within the AVAQMD

Total annual estimated emissions generated within the AVAQMD during the proposed Action's construction period, as presented in the HSR EIR/EIS, are provided in Table 9. As shown in the table, emissions from the construction phase of the Bakersfield to Palmdale Project Section within the AVAQMD would exceed the GC applicability thresholds for NO_x in certain construction years. The maximum estimated annual values of each pollutant, by non-attainment or maintenance area, and the percent of the 2012 estimated emission rates in the AVAQMD (see Table 5) for the Bakersfield to Palmdale construction are as follows:

- NO_x: 177 tpy (2.70%)
- VOCs: 17 tpy (0.29%)
- PM_{2.5}: 9 tpy (0.43%)
- PM₁₀: 11 tpy (0.12%)
- CO: 380 tpy (1.80%)

Table 9 Estimated Annual Average Emissions for the AVAQMD

Pollutants	Emissions (Tons/Year)									Conformity Applicability Thresholds (tons/year)
	2018	2019	2020	2021	2022	2023	2024	2025	2026	
Alternative 1										
NO _x	0	12	69*	72*	63*	50*	17	12	10	25
VOCs	0	2	7	7	6	5	2	2	1	25
PM _{2.5}	0	1	3	3	3	3	1	2	1	N/A
PM ₁₀	0	1	5	5	4	4	2	2	1	N/A
CO	0	7	68	175	169	150	17	11	8	N/A
Alternative 2										
NO _x	0	0	95*	132*	122*	81*	56*	38*	10	25
VOCs	0	0	9	12	12	9	7	5	1	25
PM _{2.5}	0	0	4	6	6	4	3	2	1	N/A
PM ₁₀	0	0	6	8	7	5	4	3	1	N/A
CO	0	0	96	132	122	81	56	38	10	N/A
Alternative 3										
NO _x	0	0	46*	84*	88*	35*	17	10	10	25
VOCs	0	0	3	8	9	3	2	1	1	25
PM _{2.5}	0	0	2	4	5	1	1	1	1	N/A
PM ₁₀	0	0	3	6	6	2	1	1	1	N/A
CO	0	0	53	232	239	39	17	8	8	N/A
Alternative 5										
NO _x	0	0	155*	177*	161*	128*	50*	32*	13	25
VOCs	0	0	16	17	16	13	6	5	2	25
PM _{2.5}	0	0	7	9	8	7	3	1	1	N/A
PM ₁₀	0	0	10	11	11	9	4	1	1	N/A
CO	0	0	177	380	378	357	50	29	11	N/A

Source: California High-Speed Rail Authority, 2020

Values marked with an asterisk (*) exceed applicability thresholds

¹ The emissions presented in this table reflect the impact of the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule, per the California Air Resource Board's "EMFAC Off-Model Adjustment Factors to Account for the SAFE Vehicles Rule Part One" issued on November 20, 2019. https://ww3.arb.ca.gov/msei/emfac_off_model_adjustment_factors_final_Final.pdf.

CCNM = César E. Chávez National Monument

CO = carbon monoxide

NO_x = nitrogen oxide

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

VOC = volatile organic compound

11 REGIONAL EFFECTS

As shown in Section 3.3-6.3 of the EIR/EIS, the total regional emissions for all of the applicable pollutants are lower during the operations phase of the Action than under No-Build conditions (and will therefore not exceed the *de minimis* emission thresholds). As such, only emissions generated during the construction phase were compared to the conformity threshold levels to determine conformity compliance. Based on the results shown in Table 7, Table 8, and Table 9, regional construction-phase emissions, compared to the General Conformity applicability rates, are summarized below.

11.1 Construction Impacts within the SJVAPCD

- Annual estimated VOC emissions are greater than the applicability rate of 10 tons per year in years 2020 through 2023 for Alternative 1, Alternative 2, and Alternative 5 and in years 2020 through 2022 for Alternative 3.
- Annual estimated CO emissions are less than the applicability rate of 100 tons per year in all years for all Action Alternatives.
- Annual estimated NO_x emissions are greater than the applicability rate of 10 tons per year in years 2018 and 2020 through 2026 for Alternative 1, and 2020 through 2026 for Alternative 2, Alternative 3, and Alternative 5.
- Annual estimated PM₁₀ emissions are less than the applicability rate of 100 tons per year in all years for all Action Alternatives.
- Annual estimated PM_{2.5} emissions are less than the applicability rate of 10 tons per year in all years for all Action Alternatives.
- There are no applicable thresholds for SO₂ annual emissions.

11.2 Construction Impacts within the EKAPCD

- Annual estimated VOC emissions are less than the applicability rate of 50 tons per year in all years for all Action Alternatives.
- Annual estimated NO_x emissions are greater than the applicability rate of 50 tons per year in years 2019 through 2025 for Alternative 1 and in years 2020 through 2024 for Alternative 2, Alternative 3, and Alternative 5.
- Annual estimated PM₁₀ emissions are less than the applicability rate of 70 tons per year in all years for all Action Alternatives.
- There are no applicable thresholds for CO, SO₂, and PM_{2.5} annual emissions.

11.3 Construction Impacts within the AVAQMD

- Annual estimated VOC emissions are less than the applicability rate of 25 tons per year in all years for all Action Alternatives.
- Annual estimated NO_x emissions are greater than the applicability rate of 25 tons per year in years 2020 through 2023 for Alternative 1 and Alternative 3 and in years 2020 through 2025 for Alternative 2 and Alternative 5.
- There are no applicable thresholds for CO, SO₂, PM₁₀, and PM_{2.5} annual emissions.

As such, a General Conformity Determination is required for this Action for VOC, and NO_x for the years during construction where the emissions would exceed the *de minimis* thresholds and do not meet any of the exceptions cited in 40 C.F.R. § 93.154(c). This Final Conformity Determination identified the Authority's commitment to reduce VOC and NO_x emissions through emissions offsets using a VERA with the SJVAPCD, the Air Quality Investment Program with the AVAQMD, and the Emission Banking Certificate Program in the EKAPCD, explained in Section 12.2 below.

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12 GENERAL CONFORMITY EVALUATION

For federal actions subject to a General Conformity evaluation, the regulations delineate several ways an agency can demonstrate conformity (40 C.F.R. § 93.158). This section summarizes the findings that were used to make the determination for the Action.

12.1 Conformity Requirements of Proposed Action

Based on the results shown in Table 7, Table 8, and Table 9, conformity determinations are required for construction-phase emissions for:

- **VOC**—Because annual estimated emissions are greater than the applicability rate of 10 tons per year in years 2020 through 2023 for Alternative 1, Alternative 2, and Alternative 5 and in years 2020 through 2022 for Alternative 3 in the SJVAPCD
- **NO_x**—Because annual estimated emissions are greater than the applicability rate of 10 tons per year in years 2018 and 2020 through 2026 for Alternative 1, and 2020 through 2026 for Alternative 2, Alternative 3, and Alternative 5 in the SJVAPCD; greater than the applicability rate of 50 tons per year in years 2019 through 2025 for Alternative 1 and in years 2020 through 2024 for Alternative 2, Alternative 3, and Alternative 5 in the EKAPCD; and greater than the applicability rate of 25 tons per year in years 2020 through 2023 for Alternative 1 and Alternative 3 and in years 2020 through 2025 for Alternative 2 and Alternative 5 in the AVAQMD

12.2 Compliance with Conformity Requirements

To support this General Conformity Determination, the FRA demonstrates herein that the VOC and NO_x emissions caused by the construction of the proposed Action will not result in an increase in regional VOC and NO_x emissions. This will be achieved by offsetting the VOC and NO_x emissions generated by construction of the HSR in a manner consistent with the General Conformity regulations.

The offsets are anticipated to be accomplished through a VERA between the Authority and the SJVAPCD, the Air Quality Investment Program with the AVAQMD, and the Emission Banking Certificate Program in the EKAPCD. The requirements for the VERA, the Air Quality Investment Program, and the Emission Banking Certificate Program would be implemented as part of the Action as described in the mitigation measure from the EIR/EIS:

AQ-MM#1: Offset Project Construction Emissions through Off-Site Emission Reduction Programs

In 2014, the Authority and the San Joaquin Air Pollution Control District (SJVAPCD) entered into a contractual agreement through a Memorandum of Understanding and a Voluntary Emission Reduction Agreement (VERA). The VERA mitigates (by offsetting) to net zero the project's actual emissions from construction equipment and vehicle exhaust emissions of volatile organic compound (VOC), NO_x, particulate matter (PM₁₀), and PM_{2.5}. The agreement will provide funds for the SJVAPCD's Emission Reduction Incentive Program (SJVAPCD 2011) to fund grants for projects that achieve emission reductions, with preference given to highly affected communities, thus offsetting project-related impacts on air quality. To lower overall cost, funding for the VERA program to cover estimated construction emissions for any funded construction phase will be provided at the beginning of the construction phase. At a minimum, mitigation/offsets will occur in the year of impact, or as otherwise permitted by 40 Code of Federal Regulations (C.F.R.) Part 93 Section 93.163.

The Authority shall also enter into an agreement with the Antelope Valley Air Quality Management District (AVAQMD) and Eastern Kern Air Pollution Control District (EKAPCD) to mitigate (by offsetting) to net zero the project's actual emissions from construction equipment and vehicle exhaust emissions of VOC, NO_x, PM₁₀ and PM_{2.5}. In the AVAQMD, the Authority shall participate in the Air Quality Investment Program, which funds stationary- and mobile-source

emission reduction strategies. In the EKAPCD, the Authority shall provide an application for the Emission Banking Certificate Program.

12.3 Consistency with Requirements and Milestones in Applicable SIP

The general conformity regulations state that notwithstanding the other requirements of the rule, a federal action may not be determined to conform unless the total of direct and indirect emissions from the federal action is in compliance or consistent with all relevant requirements and milestones in the applicable SIP (40 C.F.R. § 93.158(c)). This includes but is not limited to such issues as reasonable further progress schedules, assumptions specified in the attainment or maintenance demonstration, prohibitions, numerical emission limits, and work practice standards. This section briefly addresses how the construction emissions for the Action were assessed for SIP consistency for this evaluation.

12.3.1 Applicable Requirements from USEPA

The USEPA has already promulgated requirements to support the goals of the Clean Air Act with respect to the NAAQS. Typically, these requirements take the form of rules regulating emissions from significant new sources, including emission standards for major stationary point sources and classes of mobile sources as well as permitting requirements for new major stationary point sources. Since states have the primary responsibility for implementation and enforcement of requirements under the Clean Air Act and can impose stricter limitations than the USEPA, the USEPA requirements often serve as guidance to the states in formulating their air quality management strategies.

12.3.2 Applicable Requirements from CARB

In California, to support the attainment and maintenance of the NAAQS, CARB is primarily responsible for regulating emissions from mobile sources. In fact, the USEPA has delegated authority to the CARB to establish emission standards for on-road and some non-road vehicles separate from the USEPA vehicle emission standards, although the CARB is preempted by the Clean Air Act from regulating emissions from many non-road mobile sources, including marine craft. Emission standards for preempted equipment can only be set by the USEPA.

12.3.3 Applicable Requirements from SJVAPCD

To support the attainment and maintenance of the NAAQS in the SJVAB, the SJVAPCD is primarily responsible for regulating emissions from stationary sources. As noted above, SJVAPCD develops and updates its Air Quality Management Plan (AQMP) regularly to support the California SIP. While the AQMP contains rules and regulations geared to attain and maintain the NAAQS, these rules and regulations also have the much more difficult goal of attaining and maintaining the California ambient air quality standards.

12.3.4 Applicable Requirements from EKAPCD

On July 27, 2017, the EKAPCD adopted the 2017 Ozone Attainment Plan for the East Kern County nonattainment area. The Plan demonstrates that the air quality improvement was achieved due to successful implementation of ozone control strategies contained in the region's SIP. It also demonstrates that significant ozone precursor emission reductions that have been impacted in the region are permanent and enforceable. A maintenance plan is also included to ensure that the region would not experience exceedance. The Plan requests a redesignation in accordance with the Federal Clean Air Act (EKAPCD 2017).

12.3.5 Applicable Requirements from AVAQMD

Under CEQA, the AVAQMD is a commenting agency on air quality within its jurisdiction. The CEQA and Federal Conformity Guidelines, released in 2011, are intended to assist persons preparing environmental analysis or review documents for any project within the jurisdiction of the District by providing background information and guidance on the preferred analysis approach. The guidelines include annual and daily GHG emission thresholds of significance for project-generated GHGs and criteria pollutants within the jurisdiction of the AVAQMD (AVAQMD 2011).

12.3.6 Consistency with Applicable Requirements for the Authority

The Authority already complies with, and will continue to comply with, a myriad of rules and regulations implemented and enforced by federal, state, regional, and local agencies to protect and enhance ambient air quality in the SJVAB and MDAB.

In particular, due to the long persistence of challenges to attain the ambient air quality standards in the SJVAB and MDAB, the rules and regulations promulgated by CARB and SJVAPCD are among the most stringent in the U.S.

The Authority will continue to comply with all existing applicable air quality regulatory requirements for activities over which it has direct control and will meet in a timely manner all regulatory requirements that become applicable in the future.

These are appropriate USEPA, CARB, and SJVAPCD rules that are standard practice and BMPs for construction in the SJVAPCD and include control of emissions, exhaust---such as:

- SJVAPCD Rule 2201, New and Modified Stationary Source Review: Rule 2201 applies to new or modified stationary sources and requires that sources not increase emissions above the specified thresholds. If the post-Action stationary source has the potential to emit equal emissions or exceed the offset threshold levels, offsets will be required (SJVAPCD 2006). Stationary sources at the station (such as natural gas heaters) would need to be permitted by the SJVAPCD and would have to comply with best available control technology requirements. Stationary sources such as exterior washing, welding, material storage, cleaning solvents, abrasive blasting, painting, oil/water separation, and wastewater treatment and combustion would require permits. Permits would need to be obtained for equipment associated with these activities from the SJVAPCD and would need to comply with best available control technology requirements.
- SJVAPCD Rule 2280, Portable Equipment Registration requires portable equipment used at project sites for less than 6 consecutive months must be registered with SJVAPCD. The district will issue the registrations 30 days after the receipt of the application (SJVAPCD 1996).
- SJVAPCD Rule 2303, Mobile Source Emission Reduction Credits: The Action may qualify for SJVAPCD vehicle emission reduction credits if it meets the specific requirements of Rule 2303 for any of the following categories (SJVAPCD 1994):
 - Zero-Emission Transit Buses
 - Zero-Emission Vehicles.
 - Retrofit Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.
 - Retrofit Heavy-Duty Vehicles
- SJVAPCD Rule 4201 and Rule 4202, Particulate Matter Concentration and Emission Rates apply to operations that emit or may emit dust, fumes, or total suspended particulate matter. Particulate emissions from the Action must be less than the specified emissions limit (SJVAPCD 1992a, 1992b).
- SJVAPCD Rule 4301, Fuel Burning Equipment limits the emissions from fuel-burning equipment whose primary purpose is to produce heat or power by indirect heat transfer. The Action will comply with the emission limits (SJVAPCD 1992c).
- Fugitive dust regulations are applicable to outdoor fugitive dust sources. Operations, including construction operations, must control fugitive dust emissions in accordance with SJVAPCD Regulation VIII (SJVAPCD 2004). According to Rule 8011, the SJVAPCD requires the implementation of control measures for fugitive dust emission sources. The Action would also implement the mandatory control measures listed on pages 77 and 78 of the *Guide for Assessing and Mitigating Air Quality Impacts* (GAMAQI) (SJVAPCD 2015) to reduce fugitive dust emissions. These measures are not considered mitigation measures because they are required by the regulation.

Many of the control measures required by the SJVAPCD are the same or similar to the control measures listed in the Statewide Program EIR/EIS. The SJVAPCD Rule 8011 requirements are listed below:

- All disturbed areas, including storage piles, which are not being actively used for construction purposes, will be effectively stabilized for dust emissions using water or a chemical stabilizer/suppressant, or covered with a tarp or other suitable cover or vegetative ground cover.
- All onsite unpaved roads and offsite unpaved access roads will be effectively stabilized for dust emissions using water or a chemical stabilizer/suppressant.
- All land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities will be effectively controlled of fugitive dust emissions by utilizing an application of water or by presoaking.
- With the demolition of buildings up to six stories in height, all exterior surfaces of the building will be wetted during demolition.
- All materials transported offsite will be covered or effectively wetted to limit visible dust emissions, and at least six inches of freeboard space from the top of the container will be maintained.
- All operations will limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. Use of blower devices is expressly forbidden.
- Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, piles will be effectively stabilized of fugitive dust emissions utilizing sufficient water or a chemical stabilizer/suppressant.
- Within urban areas, trackout will be immediately removed when it extends 50 or more feet from the site and at the end of each workday.
- Any site with 150 or more vehicle trips per day will prevent carryout and trackout.

For projects in which construction related activities would disturb equal to or greater than one acre of surface area, the District recommends a demonstration of receipt of a District approved Dust Control Plan or Construction Notification form, before issuance of the first grading permit, be made a condition of approval.

- SJVAPCD Rule 9510, Indirect Source Review: In December 2005, the SJVAPCD adopted the Indirect Source Rule (Rule 9510) to meet the SJVAPCD's emission reduction commitments in the PM₁₀ and Ozone Attainment Plans (SJVAPCD 2005). Indirect Source Review regulation applies to any transportation project in which construction emissions equal or exceed two tons of NO_x or PM₁₀ per year. Construction of the HSR alignment (specifically, onsite off-road construction exhaust emissions) would be subject to Indirect Source Review. Accordingly, the Authority would have to submit an Air Impact Assessment (AIA) application to the SJVAPCD with commitments to reduce construction exhaust NO_x and PM₁₀ emissions by 20 percent and 45 percent, respectively. Operation of the HSR would be exempt under Sections 4.1 and 4.2 of Rule 9510.
- SJVAPCD CEQA Guidelines: The SJVAPCD prepared the GAMAQI to assist lead agencies and project applicants in evaluating the potential air quality impacts of projects in the SJVAB (SJVAPCD 2015). The GAMAQI provides SJVAPCD-recommended procedures for evaluating potential air quality impacts during the CEQA environmental review process. The GAMAQI provides guidance on evaluating short-term (construction) and long-term (operational) air emissions (Appendix F). The most recent version of the GAMAQI was adopted March 2015 and was used in this evaluation and contains guidance on the following:

- Criteria and thresholds for determining whether a project may have a significant adverse air quality impact.
 - Specific procedures and modeling protocols for quantifying and analyzing air quality impacts.
 - Methods to mitigate air quality impacts.
 - Information for use in air quality assessments and environmental documents that will be updated more frequently, such as air quality data, regulatory setting, climate, and topography.
- EKAPCD Rule 402, Fugitive Dust: The purpose of Rule 402 is to prevent, reduce, and mitigate ambient concentrations of anthropogenic fugitive dust emissions to an amount sufficient to attain and maintain the NAAQS and CAAQS. Controlling fugitive dust when visible emissions are detected may not prevent all PM₁₀ emissions, but will substantially reduce ambient concentrations (EKAPCD 2014).
 - EKAPCD CEQA Guidelines: The EKAPCD adopted the *Guidelines for Implementation of the California Environmental Quality Act of 1970, As Amended*, in 1996 (EKAPCD 2012b). The guidelines include thresholds for criteria air pollutants and guidance on implementation of mitigation measures.
 - AVAQMD Rule 403, Fugitive Dust: The provisions of this rule include actions to prevent, reduce or mitigate fugitive dust particulate matter entrained in the ambient air as a result of man-made sources. The rule limits actions that would result in a source of dust that causes 20 percent opacity or greater during an observation of three minutes or more in any one hour. It also limits PM₁₀ concentrations to under 50 micrograms per cubic meter.
 - AVAQMD Rule 109, Recordkeeping for VOC Emissions: The provisions of this rule shall apply to an owner or operator of a stationary source within the District conducting operations, which include the use of adhesives, coatings, solvents, and/or graphic arts materials, when records are required to determine a District rule's applicability or source's exemption from a rule, rule compliance, or specifically as a Permit to Operate or Permit to Construct condition (AVAQMD 2010).

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13 ESTIMATED EMISSION RATES AND COMPARISON TO *DE MINIMIS* THRESHOLDS – CUMULATIVE ANALYSIS

The study area for cumulative air quality impacts is the SJVAB and the MDAB. While separate projects for purposes of planning the HSR System, construction of the Bakersfield to Palmdale Section would overlap with the construction period for the Merced to Fresno Section and Fresno to Bakersfield Section, thereby adding to the cumulative air quality impacts within the SJVAB. In addition, construction of the Bakersfield to Palmdale Section would overlap with the construction period for the Palmdale to Burbank Section, thereby adding to the cumulative air quality impacts within the MDAB.

For purposes of full disclosure of the potential impacts, the cumulative emissions that could result from potential concurrent construction activities are presented here. As the analysis demonstrates, even where concurrent construction will take place, there would be no new pollutants exceeding the *de minimis* thresholds. In addition, construction period emissions would be offset as a result of the VERA between the Authority and the SJVAPCD, the Air Quality Investment Program with the AVAQMD, and the Emission Banking Certificate Program in the EKAPCD.

The total annual estimated emissions generated within the SJVAB during construction of the Merced to Fresno Section are provided in Table 10 and the total annual estimated emissions generated within the SJVAB during construction of the Merced to Fresno Section are provided in Table 11. The total annual estimated emissions generated within the SJVAB during the construction of the combined Merced to Palmdale sections (Merced to Fresno, Fresno to Bakersfield, plus Bakersfield to Palmdale) are provided in Table 12. As shown in this table, the combined annual construction emissions of the three sections would exceed the thresholds for NO_x in the years 2014 through 2026, VOCs in the years 2014 through 2023, and PM₁₀ in the year 2015.

These values are the peak on-site emissions during each analysis year plus maximum annual off-site emissions. The maximum estimated annual values of each pollutant, by non-attainment or maintenance area, and the percent of the 2012 estimated emission rates in the SJVAB (see Table 3) for the combined (Merced to Palmdale) construction are as follows:

- NO_x: 928 tpy (0.78%)
- VOCs: 54 tpy (0.04%)
- PM_{2.5}: 42 tpy (0.15%)
- PM₁₀: 84 tpy (0.08%)
- CO: 99 tpy (0.03%)

For the Merced to Fresno segment of the HSR system, construction emission rates were estimated in the EIR/EIS for each of the six alternatives/options previously under consideration for the Merced to Fresno Section. However, only those values associated with the Preferred Alternative are included in this Conformity Determination. These values represent the Preferred Alternative with the Avenue 21 wye option, because that option has the highest estimated emissions. If the Avenue 24 wye option is selected, the estimated emission rates will be lower than those presented in this determination.

Portions of the San Jose to Merced and Sacramento to Merced sections of the HSR would also be constructed within the SJVAB. It is possible that the schedule for construction of these sections could overlap with construction of the Merced to Fresno, Fresno to Bakersfield, and Bakersfield to Palmdale sections, contributing to the cumulative annual emissions totals of HSR construction in the SJVAB. Portions of the Palmdale to Burbank sections of the HSR would also be constructed within the MDAB. It is possible that the schedule for construction of this section could overlap with construction of the Bakersfield to Palmdale Section, contributing to the cumulative annual emissions totals of HSR construction in the MDAB.

Table 10 Estimated Annual Average Emissions for the Merced to Fresno Section

	Emissions (Tons/Year)												Conformity Applicability Thresholds (tons/year)
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
NO _x	169*	110*	115*	32*	13*	49*	15*	7	4	0	0	0	10
VOCs	15*	11*	8	2	2	11*	2	1	5	0	0	0	10
PM _{2.5}	8	6	4	2	1	3	1	0	2	0	0	0	100
PM ₁₀	13	9	6	4	1	6	2	1	9	0	0	0	100
CO ¹	29	22	11	4	2	5	4	1	1	0	0	0	100

Source: California High-Speed Rail Authority, 2014

Values marked with an asterisk (*) exceed applicability thresholds

¹ Fresno urbanized maintenance area only

CO = carbon monoxide

NO_x = nitrogen oxide

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

VOC = volatile organic compound

Table 11 Estimated Annual Average Emissions for the Fresno to Bakersfield Section

	Emissions (Tons/Year)												Conformity Applicability Thresholds (tons/year)
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
NO _x	622*	818*	549*	161*	71*	4	2	80*	1	0	0	0	10
VOCs	24*	43*	34*	9	4	0	0	4	0	0	0	0	10
PM _{2.5} ¹	20	36	29	12	10	7	0	2	0	0	0	0	100
PM ₁₀	51	75*	62	16	15	9	3	4	0	0	0	0	100
CO: Fresno ¹	31	75	66	12	4	1	1	9	0	0	0	0	100
CO: Bakersfield ¹	30	65	58	15	4	1	2	9	0	0	0	0	100

Source: California High-Speed Rail Authority, 2014

Values marked with an asterisk (*) exceed applicability thresholds

¹ Fresno and Bakersfield urbanized maintenance areas only

CO = carbon monoxide

NO_x = nitrogen oxide

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

VOC = volatile organic compound

Table 12 Estimated Annual Average Emissions for the Merced to Palmdale Section

	Emissions (Tons/Year)													Conformity Applicability Thresholds (tons/year)
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	
NO _x	791*	928*	664*	193*	139*	113*	204*	366*	274*	193*	57*	41*	20*	10
VOCs	39*	54*	42*	11*	11*	17*	20*	32*	29*	19*	7	6	2	10
PM _{2.5}	28	42	33	14	14	13	10	16	14	10	3	3	1	100
PM ₁₀	64	84*	68	20	20	20	19	27	27	15	7	3	1	100
CO: Fresno ¹	60	97	78	16	6	6	5	10	1	0	0	0	0	100
CO: Bakersfield ¹	30	65	58	15	11	2	44	99	90	85	12	7	3	100

Sources: California High-Speed Rail Authority, 2014, 2020

Values marked with an asterisk (*) exceed applicability thresholds

¹ Fresno and Bakersfield urbanized maintenance areas only

CO = carbon monoxide

NO_x = nitrogen oxide

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

VOC = volatile organic compound

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14 REPORTING AND PUBLIC COMMENTS

To support a decision concerning the Federal Action, the FRA issued a Draft General Conformity Determination for public and agency review for a 30-day period as required by 40 C.F.R §§93.155 and 93.156. In developing the analysis underlying this general conformity determination, the Authority has consulted with the SJVAPCD, EKAPCD, and AVAQMD on a variety of technical and modeling issues. The Authority has also consulted with USEPA and CARB on the overall approach to general conformity.

14.1 Availability of Final General Conformity Determination

FRA will provide copies of this Final General Conformity Determination to the appropriate regional offices of USEPA, CARB, SJVAPCD, EKAPCD, and AVAQMD. The Final General Conformity Determination is available at <http://www.regulations.gov>, Docket No. FRA-2021-0046, and on FRA's website at <https://railroads.dot.gov/environment/environmental-reviews/clean-air-act-california-general-conformity-determinations>.

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15 FINDINGS AND CONCLUSIONS

As part of the environmental review of the proposed Action, FRA conducted a General Conformity evaluation pursuant to 40 C.F.R. Part 93 Subpart B. The General Conformity regulations apply at this time to this Federal Action because the Action is located in an area that is designated as an extreme nonattainment area for the 8-hour ozone standard, nonattainment for PM_{2.5}, and a (partial) maintenance area for PM₁₀ and CO. The FRA conducted the General Conformity evaluation following all regulatory criteria and procedures and in coordination with USEPA, SJVPCD, EKAPCD, AVAQMD, and CARB. As a result of this review, the FRA concluded, based on the fact that Action-generated emissions will either be fully offset (for construction phase) or less than zero (for operational phase), that the proposed Action's emissions can be accommodated in the SIP for the SJVAB. FRA has determined that the proposed Action as designed will conform to the approved SIP, based on:

- A commitment from the Authority that construction-phase NO_x and VOC emissions will be offset consistent with the applicable federal regulations through a VERA with the SJVAPCD, the Air Quality Investment Program in the AVAQMD, and the Emission Banking Certificate Program in the EKAPCD.
- The SJVAPCD, EKAPCD, and AVAQMD will seek and implement the necessary emission reduction measures, using Authority funds.
- The SJVAPCD, EKAPCD, and AVAQMD will serve in the role of administrator of the emissions reduction projects and verifier of the successful mitigation effort.

Therefore, FRA concludes that the proposed Action, as designed, conforms to the purpose of the approved SIP and is consistent with all applicable requirements.

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16 REFERENCES

- Antelope Valley Air Quality Management District (AVAQMD). 2004. *2004 Ozone Attainment Plan*. April 20, 2004.
- . 2008. *Western Mojave Desert Ozone Attainment Plan*. www.arb.ca.gov/planning/sip/planarea/mojavesedsip.htm (accessed May 14, 2015).
- . 2010. *AVAQMD Rule 109 – Recordkeeping for VOC Emissions*. April 20, 2010. www.avaqmd.ca.gov/Modules/ShowDocument.aspx?documentid=906 (accessed June 4, 2015).
- . 2011. *CEQA and Federal Conformity Guidelines*. www.avaqmd.ca.gov/Modules/ShowDocument.aspx?documentid=2908 (accessed April 2015).
- . 2014. *Attainment Status: AVAQMD Designations and Classifications*. www.avaqmd.ca.gov/index.aspx?page=289 (accessed May 2015).
- California Air Resources Board (CARB). 2004. *California State Implementation Plan (SIP): 2004 Revisions to the Carbon Monoxide Maintenance Plan*. July 2004.
- . 2015. *California Air Basins*. www.arb.ca.gov/knowzone/basin/basin.swf (accessed May 14, 2015).
- . 2020. iADAM: Air Quality Data Statistics Top 4 Summary. Website: <https://www.arb.ca.gov/adam/topfour/topfour1.php> (accessed January 2020).
- California High-Speed Rail Authority (Authority). 2018a. *Burbank to Los Angeles Project Section: Air Quality and Global Climate Change Technical Report*. January 2018.
- . 2018b. *Bakersfield to Palmdale Project Section Final Air Quality and Global Climate Change Technical Report*.
- California High-Speed Rail Authority and Federal Railroad Administration (Authority and FRA). 2014. *Fresno to Bakersfield Section Final Environmental Impact Report/Environmental Impact Statement*.
- Eastern Kern Air Pollution Control District (EKAPCD). 2012a. *Attainment Status*. July 31. www.kernair.org/Documents/EKAPCD%20Attainment%20Info%207-31-12.pdf (accessed May 14, 2015).
- . 2012b. *Guidelines for Implementation of the California Environmental Quality Act (CEQA) of 1970, As Amended*. Amended July 8, 2012. www.kernair.org/Documents/CEQA/CEQA_Guidelines%20&%20Charts.pdf (accessed October 2016).
- . 2014. *Rule 402 Fugitive Dust*. September 10, 2014. www.kernair.org/Documents/Rules/Rules%20Sept%202014/402%20Fugitive%20Dust%20Staff%20Report%209-10-14.pdf (accessed June 4, 2014).
- . 2017. *2017 Ozone Attainment Plan For 2008 Federal 75 ppb 8-Hour Ozone Standard*. July 27. www.kernair.org/Documents/Announcements/Attainment/2017%20Ozone%20Plan_EKAPCD_Adopted_7-27-17.pdf (accessed June 2019).
- Federal Railroad Administration and State of California, 2019. *Memorandum of Understanding between the Federal Railroad Administration and the State of California Acting Through Its California State Transportation Agency and Its California High-Speed Rail Authority, for the State of California's Participation in the Surface Transportation Project Delivery Program Pursuant to 23 U.S.C. 327*. July 23.
- San Joaquin Valley Air Pollution Control District (SJVAPCD). 1992a. *Rule 4201 Particulate Matter Concentration*. Amended December 17, 1992.
- . 1992b. *Rule 4202 Particulate Matter – Emission Rate*. Amended December 17, 1992.
- . 1992c. *Rule 4301 Fuel Burning Equipment*. Amended December 17, 1992.

- . 1994. Rule 2303 Mobile Source Emission Reduction Credits. Adopted May 19, 1994.
- . 1996. Rule 2280 Portable Equipment Registration. Amended May 16, 1996.
- . 2004. 2004 Extreme Ozone Attainment Demonstration Plan: San Joaquin Valley Air Basin Plan Demonstrating Attainment of Federal 1-hour Ozone Standards. October 2004. www.valleyair.org/Air_Quality_Plans/AQ_Final_Adopted_Ozone2004.htm (accessed May 14, 2015).
- . 2005. Rule 95410 Indirect Source Review. Adopted December 15, 2005.
- . 2006. Rule 2201 New and Modified Stationary Source Review Rule. Amended September 21, 2006.
- . 2007a. 2007 Ozone Plan. April 2007. www.valleyair.org/Air_Quality_Plans/AQ_Final_Adopted_Ozone2007.htm (accessed May 14, 2015).
- . 2007b. PM10 Maintenance Plan and Request for Redesignation. September 30, 2007
- . 2009. *District Policy-Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency*. www.valleyair.org/Programs/CCAP/12-17-09/2%20CCAP%20-%20FINAL%20District%20Policy%20CEQA%20GHG%20-%20Dec%2017%202009.pdf (accessed April 2015).
- . 2011. Frequently Asked Questions. www.valleyair.org/General_info/Frequently_Asked_Questions.htm#About%20The%20Air%20Pollution%20Problem (accessed May 24, 2011).
- . 2013a. Ambient Air Quality Standards & Valley Attainment Status. www.valleyair.org/aqinfo/attainment.htm (accessed May 14, 2015).
- . 2015. Guidance for Assessing and Mitigating Air Quality Impacts. March 19, 2015. www.valleyair.org/transportation/GAMAQI_3-19-15.pdf (accessed June 9, 2015).
- . 2018. 2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards. November 15, 2018. <http://valleyair.org/pmplans/documents/2018/pm-plan-adopted/2018-Plan-for-the-1997-2006-and-2012-PM2.5-Standards.pdf> (accessed June 2019).
- U.S. Environmental Protection Agency (USEPA). 1994. *General Conformity Guidance: Questions and Answers*. July 13, 1994. Accessible at: https://www.epa.gov/sites/production/files/2016-03/documents/gcggq_940713.pdf (accessed April 4, 2017).
- . 2006. Emission Factors & AP 42. <https://www3.epa.gov/ttnchie1/ap42/> (accessed July 2016).
- . 2009. Emission Factors for Locomotives. April 2009. <https://www3.epa.gov/nonroad/locomotv/420f09025.pdf> (accessed July 2016).
- . 2010. *Federal Register*, Vol. 74, No. 209, Friday, October 30, 2009, 40 C.F.R. Parts 86, 87, 89 et al. Mandatory Reporting of Greenhouse Gases; Final Rule. <https://www.gpo.gov/fdsys/pkg/FR-2009-10-30/pdf/E9-23315.pdf> (accessed July 2016).
- . 2020. Outdoor Air Quality Data Monitor Values Report. Website: <https://www.epa.gov/outdoor-air-quality-data/monitor-values-report> (accessed January 2020).
- Western Regional Climate Center. 2011. *Historical Climate Information, Bakersfield, California, Normals, Means, and Extremes*. www.wrcc.dri.edu/summary/lcd.html (accessed May 14, 2015).

17 PREPARER QUALIFICATIONS

Amy Fischer, Senior Air Quality Scientist, Ms. Fischer has a B.S. in Environmental Policy Analysis from the University of Nevada, Reno. With 20 years of experience, Amy Fischer serves as a senior air quality and greenhouse gas emissions specialist qualified to conduct analyses for a variety of infrastructure projects. Ms. Fischer is the technical lead on air quality and climate change impact analyses documents and oversees the research, and preparation of technical reports. She is skilled in air quality assessment models including: The California Emissions Estimator Model (CalEEMod), Emission Factor models (EMFAC/OFFROAD), Road Construction Estimator Model (RoadMod) and Line Dispersion Models (CALINE).

Tin Cheung, Senior Air Quality Scientist, Mr. Cheung graduated with a bachelor's degree in Environmental Studies and Geography from the University of California at Santa Barbara. He is a Senior Air Quality Scientist with 23 years of experience in the preparation of air quality and noise studies. He has worked on a multitude of small and large projects and is extremely proficient in quantitative computer models which include USEPA's AERMOD air pollutant dispersion model, the California Emissions Estimator Model (CalEEMod), CARB's EMFAC emission factor model, SMAQMD's Road Construction Emissions Model, Caline4 roadway air pollutant dispersion model and numerous other air quality and noise models.

Matthew Long, MEng, MPP, Senior Environmental Scientist, prepared the greenhouse gas analyses for this project. Matthew holds a Master's Degree in Environmental Science from the Yale School of Forestry and Environmental Studies and a Master's Degree in Public Policy from the Luskin School of Public Affairs at UCLA. He also has over 9 years of professional consulting experience providing CEQA/NEPA analysis for large infrastructure projects, including electrical transmission projects, flood control projects, and commercial-scale renewable energy development projects. Recently, Mr. Long provided management support and revised the Geology and Soils and Noise analyses for the BLM's LUPA and Final EIS for the Desert Renewable Energy Conservation Plan.

Cara Carlucci, Planner, Ms. Carlucci holds a B.S. in City & Regional Planning with a minor in Real Property Development from California Polytechnic State University, San Luis Obispo. At LSA, she provides planning and technical assistance to project managers on a variety of planning and environmental documents including environmental assessments, initial studies, and environmental impact reports. She has contributed to the CEQA air quality analysis for residential, commercial, and infrastructure projects, as well as stand-alone air quality impact studies.

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APPENDIX A: FINAL GENERAL CONFORMITY DETERMINATION COMMENTS AND RESPONSES

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PUBLIC SUBMISSION

Comment from Antje Lauer

Posted by the **Federal Railroad Administration** on May 21, 2021

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Comment

Have you considered testing the soil that you disturb for the presence of *Coccidioides immitis*, the Valley fever fungus? Graded soil left behind after construction is completed bears a risk for the public to contract coccidioidomycosis when fugitive dust emerges from these sites during the dry season or when the trains rush by. We have seen the spike in Valley fever incidence in the Lancaster area (Northern Los Angeles County), after numerous large scale solar plants were built, and the soil was left bare of any protection. Bakersfield is in the highly endemic area of the pathogen. Just educating the workers about the risk of contracting Valley fever (as required by law) and moistening the soil during construction is only a short term strategy to reduce the risk of contracting coccidioidomycosis on site during the construction process. Dust emerging from these disturbed sites can be carried by the wind to places far away and poses a risk for the general public living close by and further away that should not be underestimated. There are labs that perform soil testing for *Coccidioides*. If the pathogen is detected, the soil should be revegetated to reduce the risk of dust emerging from these sites. You can contact me if you like to learn more.

Thanks for reading my comment.

Sincerely,

Antje Lauer (Professor and Microbiologist, CSU Bakersfield)

Attachments 1

[Download \(https://downloads.regulations.gov/FRA-2021-0046-0003/attachment_1.pdf\)](https://downloads.regulations.gov/FRA-2021-0046-0003/attachment_1.pdf)

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Combining Forces - The Use of Landsat TM Satellite Imagery, Soil Parameter Information, and Multiplex PCR to Detect *Coccidioides immitis* Growth Sites in Kern County, California

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Abstract

Coccidioidomycosis is a fungal disease acquired through the inhalation of spores of *Coccidioides* spp., which afflicts primarily humans and other mammals. It is endemic to areas in the southwestern United States, including the San Joaquin Valley portion of Kern County, California, our region of interest (ROI). Recently, incidence of coccidioidomycosis, also known as valley fever, has increased significantly, and several factors including climate change have been suggested as possible drivers for this observation. Up to date details about the ecological niche of *C. immitis* have escaped full characterization. In our project, we chose a three-step approach to investigate this niche: 1) We examined Landsat-5-Thematic-Mapper multispectral images of our ROI by using training pixels at a 750 m × 750 m section of Sharktooth Hill, a site confirmed to be a *C. immitis* growth site, to implement a Maximum Likelihood Classification scheme to map out the locations that could be suitable to support the growth of the pathogen; 2) We used the websoilsurvey database of the US Department of Agriculture to obtain soil parameter data; and 3) We investigated soil samples from 23 sites around Bakersfield, California using a multiplex Polymerase Chain Reaction (PCR) based method to detect the pathogen. Our results indicated that a combination of satellite imagery, soil type information, and multiplex PCR are powerful tools to predict and identify growth sites of *C. immitis*. This approach can be used as a basis for systematic sampling and investigation of soils to detect *Coccidioides* spp.

Citation: Lauer A, Talamantes J, Castañón Olivares LR, Medina LJ, Baal JDH, et al. (2014) Combining Forces - The Use of Landsat TM Satellite Imagery, Soil Parameter Information, and Multiplex PCR to Detect *Coccidioides immitis* Growth Sites in Kern County, California. PLoS ONE 9(11): e111921. doi:10.1371/journal.pone.0111921

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Introduction

Valley fever research has predominantly focused on the medical and epidemiological aspects of *Coccidioides immitis* and *Coccidioides posadasii*, the fungi that cause coccidioidomycosis ([1,2], and references therein). *Coccidioides* spp. can have a complete life cycle as soil dwelling organisms but if the soil is disturbed, their arthroconidia can become air-borne and are able to infect a host via the respiratory tract. About 60% of infected patients report no symptoms [3]; about 25% exhibit severe flu-like symptoms, such as cough, sputum, fever, and muscle aches; the remaining 15% become very ill with pneumonia-like symptoms (e.g. pleurisy and heavier sputum) requiring medication and bed rest. In a small number of cases (about 0.5–1%), the disease disseminates beyond the lungs to e.g. the skin, bones, and/or meninges of the brain, and the disease can be fatal. Certain sectors of the population seem to

be more susceptible to infection, such as the very young, persons newly arrived to the endemic areas (since immunity develops with infection), field-, and construction workers, and those with impaired immune systems [4].

Coccidioides spp. are endemic in the southern part of the San Joaquin Valley in California, southern California, the southern part of Arizona, New Mexico and Texas, most of northern Mexico, and some areas in Guatemala, Honduras, Venezuela, northeastern Brazil, Argentina, and Paraguay [5,6]. Given its geographic distribution, it is evident that *C. posadasii* is able to flourish in desert regions of the Americas (besides California), in contrast to its close relative *C. immitis* which seems to be restricted to areas in California. Of the two fungal species, it is *C. immitis* which afflicts the San Joaquin Valley portion of Kern County, California [7,8] which is the Region of Interest (ROI) of this study. However, population genomic sequencing of *Coccidioides* spp.

revealed recent hybridization between both species [9], and nothing is known about the distribution and ecology of these hybrids.

It is reasonable to expect that climatic fluctuations might affect the rate at which humans become infected [4]. For example, an extended drought might decimate less heat tolerant, non-sporeforming soil microorganisms that had acted as natural antagonists to the pathogen in its natural environment. A wetter than-normal rainy season could help *Coccidioides* spp. bloom, and windy spells might facilitate the dispersal of its arthroconidia. The “grow and blow” hypothesis has first been introduced by Comrie and Glueck [10]. It has long been surmised that *Coccidioides* spp. are generally poor competitors [11], but that they are more heat-resistant than competing microorganisms – thus, it can be expected that hot summers might favor its presence or dominance. Indeed, anecdotal evidence to these effects is well documented in the literature [12–20]. There have been a number of attempts at demonstrating this connection quantitatively with various degrees of success [10,11,21–25]. Yet, despite extensive study, there is currently no ecologically consistent link identified between the environment and coccidioidomycosis rates [26]. The predicted warming of the climate in California will add another piece of the puzzle in the already complicated interrelationships of environmental factors that might support or suppress the growth of pathogens with environmental reservoirs [27,28]. However, occasionally, the pathogen was detected in other regions, such as the recent detection of *Coccidioides immitis* in soils of Eastern WA [29].

There also have been several attempts to characterize the ecological niche of *Coccidioides* spp. in more detail [4,31–33], but we still do not have a complete description of this niche. To date, Fisher et al. [31] present the most comprehensive review of this subject. We need to direct attention to a few fundamental points about what is known in regards to this niche. First, it is important to realize that *C. immitis* and *C. posadasii* do not grow in disturbed soils [4,30,31] such as cultivated fields, gardens, etc. Second, whereas it was initially thought that *Coccidioides* spp. ecological niche corresponds to the Lower Sonoran Life Zone (as defined and described by Merriam [34]), or similar environments [14,35,36]. Later research [30] showed that this is not quite correct, and indeed more recent works [31,32,37,38] suggested that the fungus’s niche corresponds more closely with thermic and hyperthermic soils in which temperatures can reach or exceed 22°C in 50 cm depth. Fisher et al. [31] described sites where *Coccidioides* spp. were suspected to have been present because humans or animals were reported to have been infected at these sites. Fisher et al. [31] also made the general observations that the vegetation at those sites ranged from sparse to relatively thick cover in lower Sonoran Deserts, Chaparral-upper Sonoran brush and grasslands, as well as Mediterranean savannas and forested foothills. Furthermore, they stated that the temperature regimes, climate conditions in general, and soil textures are the only indicative variables of the presence of *Coccidioides* spp. Microbial diversity in soils is highly influenced by the habitat’s chemical and physical parameters. But biotic soil factors such as plant and microeukaryote diversity influence fungal and bacterial soil communities as well through root exudation (additional available nutrients), microbial antagonism (antibiotic production) and synergism, as well as through selective grazing by microeukaryotes [32,39–40]. It is currently being discussed that the pathogen is in fact not very competitive as a soil saprophyte because it has lost the ability to produce a variety of enzymes that are involved in important biodegradation processes of soil organic matter, which might explain the difficulty to detect it in bulk soil [41].

There are few published data available about the distribution of *C. immitis* growth sites in Kern County, California [42] most probably because it has been very difficult in the past to isolate and identify *Coccidioides* spp. from soil and dust samples [4,14,30]. Recently, first attempts using molecular biological techniques to identify *C. immitis* in bulk soil samples from Kern County, predominantly around Bakersfield, have been performed [32]. Based on that study, it appeared that *C. immitis* is likely to be found in the Bakersfield area at locations that are non-agricultural and have about equal parts of sand, clay, and silt (clay loam), a pH between 7.8 and 8.5, an available water capacity of about 0.15–0.2 cm/cm, a water content of about 30% (1/3 bar), an available water supply (0–25 cm) of 4–5 cm, and a Cation Exchange Capacity (CEC7) of over 20 milliequivalents per 100 grams.

The idea of using remote sensing (RS) techniques to piece together environmental characteristics, environmental change, and their relationship to disease transmission has been used extensively in connection with other diseases such as malaria [43], cholera [44], and African trypanosomiasis [45]. Even though the ecological niche of *C. immitis* is not well characterized, we present here a RS technique that allows the mapping of sites around Bakersfield, California, where the pathogen is suspected to grow based on data obtained in a previous study by Lauer et al. [32]. Our method utilized a location well-known for being a *C. immitis* growth site (Sharktooth hill [STH], Bakersfield, California) as a basis, and then examined satellite images of the ROI to find all locations with similar spectral signatures. This is similar to characterizing the growth sites by the vegetation that tends to grow in the same environment as *C. immitis*, using the vegetation type as a marker. This is reasonable because the vegetation type closely reflects the co-variation of the relevant physical and chemical parameters such as clay and sand content, temperature, pH, nutrients, water content, etc., and also affects the development of the microbial diversity in the soils [46].

To validate our approach, we investigated if a combination of remote sensing and soil parameter information can predict locations which might be suitable to support the growth of *C. immitis*, followed by a molecular biological approach to detect the fungus in these soils with a culture independent polymerase chain reaction (PCR) based method [32,47].

Material and Methods

No specific permissions were required for the soil sampling. Our field study did also not involve endangered or protected species.

Multispectral image analysis

Landsat-5 Thematic Mapper (TM) L1G corrected multispectral images were downloaded from the United States Geological Survey archive (<http://EarthExplorer.usgs.gov>). The satellite relayed a continuous data stream which was then framed into individual scenes each 23.92 sec (see, e.g., <http://landsat.gsfc.nasa.gov/about/wrs.html>). The images for path 42, rows 35 and 36: Worldwide Reference System to cover our ROI were downloaded, and then the two images were mosaicked. Most of the analysis that is presented here was performed on a spatial subset of this mosaicked image. This subset corresponds to an area approximately one million hectares that covers the San Joaquin Valley portion of Kern County. Our work mainly focused on a multispectral image taken on April 20, 2008 at 10:23 PM local time. This image was chosen because it was obtained at a date (during spring) where microbial activity and biomass in the soil is generally considered high, because of supportive environmental parameters, such as moderate temperatures and increased water

Table 1. Location and description of sampling sites used as test data for the remote sensing approach.

sampling sites and year sampled	coordinates	soil type (map unit symbol)	GS or AS of the pathogen	rodent activity*
Bakersfield city				
1. CSUB Children Center ('08, '09)	119° 06' 29.0'' W, 35° 20' 57.0'' N	Wasco sandy loam (243)	AS	yes
2. Belle Terrace/P Str. ('11)	119° 00' 37.2'' W, 35° 20' 49.8'' N	Kimberlina Urban land, Cajon-complex (180)	GS	no
3. Belle Terrace/Gay Str. ('11)	118° 59' 22.7'' W, 35° 20' 40.0'' N	Kimberlina Urban land, Cajon-complex (180)	GS	yes
4. Marella Way ('11)	118° 63' 15.0'' W, 35° 21' 40.0'' N	Kimberlina Urban land, Cajon-complex (180)	NS	no
5. Flood Plain CSUB ('08, '09)	119° 06' 05.0'' W, 35° 21' 16.0'' N	River Wash (229)	AS	no
SW Bakersfield				
6. Bike Path West ('08, '09)	119° 15' 06.0'' W, 35° 18' 20.0'' N	Cajon sandy loam (125)	NS	yes
7. Lake Webb ('08, '09)	119° 16' 27.0'' W, 35° 13' 53.0'' N	Zalvidea sandy loam (240)	AS	no
8. Cole's Levee Rd. I ('08, '09, '11)	119° 13' 60.0'' W, 35° 14' 08.0'' N	Garces loam (180)	GS	yes
9. Cole's Levee Rd. II ('11)	119° 13' 65.3'' W, 35° 14' 09.7'' N	Garces loam (180)	GS	yes
10. Olen Avenue ('11)	119° 14' 50.0'' W, 35° 14' 72.0'' N	Garces loam (180)	GS	yes
11. Valley Street Field ('08, '09)	118° 52' 18.0'' W, 35° 24' 29.0'' N	Delano sandy loam (139)	AS	no
NE Bakersfield				
12. Across CALM ('11)	118° 53' 14.1'' W, 35° 25' 50.3'' N	Chanac Clay Loam (130)	GS	yes
13. Ant Hill Oil Field ('08, '09, '11)	118° 51' 25.0'' W, 35° 23' 50.0'' N	Chanac Clay Loam (131)	GS	yes
14. Round Mt. Rd. I ('08, '09)	118° 52' 20.0'' W, 35° 27' 10.0'' N	Xeric Torriorthents-Calcic Haploxerept association (174)	AS	yes
15. Round Mt. Rd. II ('08, '09)	118° 53' 30.0'' W, 35° 28' 42.0'' N	Xeric Torriorthents-Calcic Haploxerept association (174)	NS	yes
16. Sharktooth hill I	118° 55' 03.4'' W, 35° 27' 44.5'' N	Chanac Pleito Premier Association (305)	nd	yes
17. Sharktooth hill 2	118° 54' 37.0'' W, 35° 28' 20.0'' N	Pleito Trigo Chanac Complex (205)	GS	yes
18. Sharktooth hill 3	118° 54' 33.0'' W, 35° 28' 21.3'' N	Pleito Trigo Chanac Complex (205)	GS	yes
NW Bakersfield				
19. Acari Rd. ('11)	119° 15' 26.8'' W, 35° 23' 16.1'' N	Garces silt loam (156)	NS	no
20. Elementary Lne. ('11)	119° 15' 16.1'' W, 35° 25' 20.5'' N	Panoche clay loam (211)	GS	no
21. Beech Str. ('11)	119° 15' 43.5'' W, 35° 26' 39.6'' N	Garces silt loam (156)	GS	yes
Wasco				
22. Gun Club Rd.('11)	119° 29' 54.0'' W, 35° 39' 34.9'' N	Garces silt loam (156)	NS	yes
23. McCoy Rd. ('11)	119° 31' 34.3'' W, 35° 37' 24.8'' N	Garces silt loam (156)	NS	yes
Arvin				
24. Di Giorgio Rd. ('11)	118° 57' 28.7'' W, 35° 15' 06.6'' N	Garces loam (180)	GS	yes
25. Bear Mt. Rd. ('11)	118° 57' 05.9'' W, 35° 12' 30.0'' N	Garces loam (180)	GS	yes

Growth sites (GS), accumulation sites (AS) and negative sites (NS) were determined by multiplex PCR results, nd: not determined.

* Proof of rodent activity was observed in the immediate neighborhood of the sampling site. Soil disturbing activity was also observed by burrowing owls, coyotes, kit foxes, spiders or large ants at some locations. The dominant rodents observed were ground squirrels, kangaroo rats and hares.

doi:10.1371/journal.pone.0111921.t001

content. Furthermore, this image had 0% cloud cover. Our analysis started by defining a 25 pixel ×25 pixel area centered at latitude 35° 28' 20.29'' N, and longitude 118° 54' 37.04'' W. This location is at STH, an area where *C. immitis* has been repeatedly detected ([30,31,48], this study). These 625 pixels were used to train the algorithm, and thus, they define a spectral class which is referred to in what follows as the “STH-vegetation class”. To implement the Maximum Likelihood Classification (MLC) method distributed (Richards & Jia, 2006), TM bands 1 (0.45–0.52 μm, blue-green), 2 (0.52–0.60 μm, green), 3 (0.63–0.69 μm, red), 4 (0.76–0.90 μm, near infrared), 5 (1.55–1.75 μm, mid infrared), and 7 (2.08–2.35 μm, mid infrared) were used. Band 6 (10.40–12.50 μm, thermal infrared) was not used in our MLC scheme because the resolution was 60 m instead of the 30 m (as it is for the other bands). However, this band was used to compute surface temperatures as described in more detail below. Our MLC scheme then entailed computing, for each of the pixels in the ROI, the

probability that it belonged to the STH-vegetation class. This probability was assumed to be normally distributed [49], and thus is given by

$$p(x) = \frac{1}{(2\pi)^{N/2} |\Sigma|^{1/2}} e^{-\left[\frac{1}{2} (x-m)^T \Sigma^{-1} (x-m) \right]}$$

where \mathbf{x} is a vector location in pixel space, $N = 6$ is the dimensionality of pixel space, Σ the covariance matrix of the distribution, and \mathbf{m} is the mean position of the spectral class. (\mathbf{m} and Σ are computed from the training pixels). A threshold value was set at p_0 , meaning that if a pixel had a probability $p \geq p_0$ of being in the STH-vegetation class, then the pixel was put into this

Kern County 4-20-2008

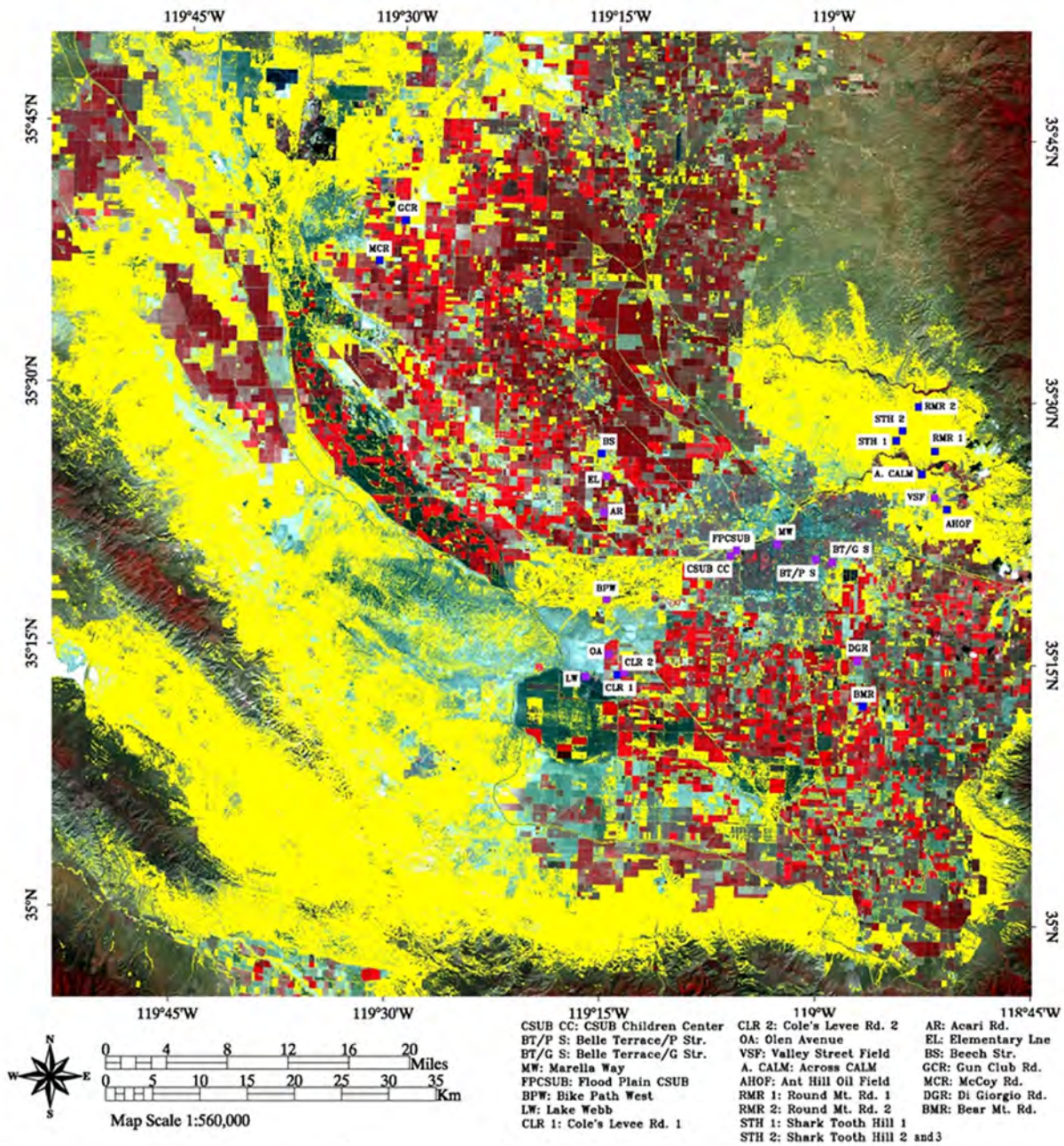


Figure 1. False color image of the ROI on April 20, 2008. Yellow pixels indicate locations in the STH-vegetation class, $p_0=0.95$ and $f=0.32$. doi:10.1371/journal.pone.0111921.g001

spectral class. Otherwise ($p < p_0$) the pixel was simply left unclassified. Clearly, as the parameter p_0 decreased, the fraction f of pixels in the ROI which belong to the STH-vegetation class increased. This is because pixels which are less and less like the training pixels get included into this class.

It was also investigated how much p_0 needed to be reduced from 1 until the sites which tested positive for *C. immitis* came into the STH-vegetation class. This served to calibrate the method and as a validation step. Clearly, if the *C. immitis*-positive sites get included in the STH-vegetation class for $p_0 \lesssim 1$, then our method is robust.

However, if our *C. immitis*-positive sites remain unclassified until $p_0 \gtrsim 0$, then our spectral class is poorly defined.

Lastly, we determined the area (km²) that was characterized by vegetation that belonged into the STH-vegetation class over the sampling period and until early 2014 using landsat images and the software ENVI 5.1+IDL 8.3.

Surface temperatures

Surface temperature variations across the ROI were of interest as well. In addition to utilizing a vegetation class to assess potential

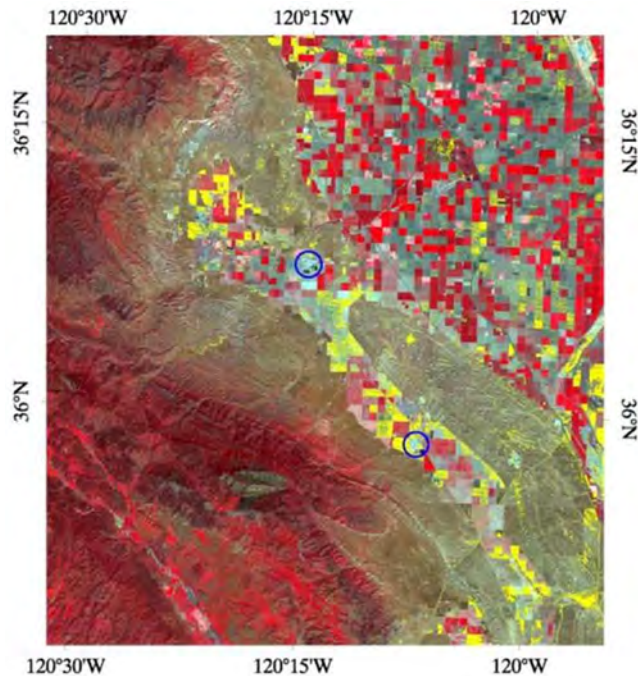


Figure 2. False color image of two San Joaquin Valley prisons. STH-vegetation class pixels are shown in yellow. The circles indicate the location of the prisons. Upper left: Pleasant Valley State Prison in Fresno County, California. Lower right: Avenal State Prison in Kings County, California. Images were taken on April 20, 2008. Maximum Likelihood Classification scheme was used with $p_0 = 0.95$. doi:10.1371/journal.pone.0111921.g002

sites for *C. immitis* growth, surface temperature variations across the ROI may also help to characterize the niche of this fungus. Landsat-5 TM-6 is an infrared band. This band (from the same April 20, 2008 image) was used as follows to examine the thermal landscape of our ROI. The same area in STH was taken as training pixels, and their average \bar{x} and standard deviation σ were computed. Then, a simple parallelepiped method [49] was used to find other locations in the ROI with similar values. Thus, all pixels whose value was in the ranges $(x - n\sigma, x + n\sigma)$, $n = 1, 2, 3$ were put into this spectral class, and we referred to this as the “STH-thermal” class. All other pixels were left unclassified. The image’s digital numbers were converted to temperatures by applying the procedure described in the National Aeronautics and Space Administration’s Landsat 7 Science Data Users Handbook (<http://landsathandbook.gsfc.nasa.gov/>). See also Chander & Markham [50] for details. As a result, a map was obtained where the surface temperature was close to STH at the time the image was taken.

Weather data

Precipitation data for the Southern San Joaquin Valley was obtained from the California Data Exchange Center (http://cdec.water.ca.gov/snow_rain.html). The cumulative monthly precipitation (inches) over time was assembled from 5 stations (Calaveras Big Trees [CVT], Hetch Hetchy [HTH], Yosemite HQ [YSV], North Fork RS [NFR], and Huntington Lake [HNT]). A more detailed analysis of the weather data for Bakersfield in particular was not the focus of this study.

Physical and chemical soil parameters

To determine physical and chemical soil parameters of all soil samples, the websoilsurvey database of the United States Department of Agriculture (<http://websoilsurvey.nrcs.usda.gov/>) was used. Furthermore, all sampling sites were characterized by using the soil series extent mapping tool from the website of the Center of Environmental Informatics (CEI) (http://www.cei.psu.edu/cei_wp/). Thus, through agricultural and environmental support tools available from the USDA and CEI websites, our sampling sites were further characterized in regard to land use and vegetation. Additional geological information was obtained as well, such as the distribution of certain soil types and series in California. By using the soil series extent mapping tool, our soil samples were linked to known soil series and soil groups that are characteristic for the Southern San Joaquin Valley and beyond.

Soil sampling sites

Soil physical and chemical parameters that could likely support the growth of the pathogen based on results of the study by Lauer et al. [32] were used to choose 13 new sites that were investigated in winter and spring 2011 (Jan–Apr). Additionally, two sites that were found to be strong growth sites of the pathogen in 2008/2009 were also investigated again in 2011. Six sites where the pathogen was not detected were included in this study as well. Sampling sites included in this study were all non-agricultural silt, clay or sandy loams that differed in regard to physical and chemical parameters. All sites were located within the Central Valley Portion of Kern County. Overall, 23 sites were investigated in this study by satellite imagery and multiplex PCR. Two additional sites from STH were investigated by satellite imagery only (reference sites). Based on information from the USDA websoilsurvey database, the soils belonged to 13 different soil map units. Samples were taken each month in 2008, 2009 and 2011 (some sites were not sampled in 2011) from three different depths (0–2 cm, 5–7 cm, and 18–20 cm), placed on ice during transport to the lab, and frozen at -80°C when not processed immediately. See table 1 for detailed information about all sites, including exact location, soil type, observed rodent activity and indication of the presence or absence of *C. immitis*. Also see the first column of table two for the year they were investigated. Our sampling sites were not chosen based on Landsat imagery. They were chosen mainly based on the percentage of clay in the soil as indicated by the USDA websoilsurvey database. About 30% of clay had been indicative of a potential *C. immitis* positive site based on previous research [32]. After results from the multiplex PCR approach became available, we evaluated if sites where *C. immitis* was detected correlate with sites indicated by Landsat imagery to fall into STH vegetation sites.

DNA extraction and multiplex Polymerase Chain Reaction (PCR)

DNA was extracted from well-mixed soil samples (two replicates) using the MoBio PowerSoil DNA Isolation Kit (MoBio Laboratories, Solana Beach, CA) following the manufacturer’s protocol. The multiplex PCR approach developed by Greene et al. [47] and optimized for the detection of *C. immitis* from soil DNA by Lauer et al. [32] was used to determine the presence of fungi in general and specifically *C. immitis* in all soil samples with two primer pairs. Primer pair ITSC1A/ITS C2 (18S ribosomal intertranscribed spacer [ITS] region, 223 bp), which is specific for *C. immitis*, was used in combination with primer pair RDS478/RDS482 (18S ribosomal gene, 650 bp) which amplifies 18S rDNA from all fungi. The ITS region was chosen due to its high

Table 2. Probability that the sites fall in the STH-vegetation class, as predicted by Landsat data.

sampling sites and year sampled	$P_0 = 0.90$			$P_0 = 0.95$				
	4/20/08	4/23/09	4/26/10	4/29/11	4/20/08	4/23/09	4/26/10	4/29/11
Bakersfield city								
1. CSUB Children Center ('08, '09)	N	N	N	N	N	N	N	N
2. Belle Terrace/P. Str. ('11)	Y	N	N	N	N	N	N	N
3. Belle Terrace/Gay Str. ('11)	N	N	Y	N	N	N	Y	N
4. Marella Way ('11)	N	N	N	N	N	N	N	N
5. Flood Plain CSUB ('08, '09)	N	N	N	N	N	N	N	N
SW Bakersfield								
6. Bike Path West ('08, '09)	N	N	N	N	N	N	N	N
7. Lake Webb ('08, '09)	N	N	N	N	N	N	N	N
8. Cole's Levee Rd. I ('08, '09, '11)	Y	Y	Y	Y	Y	Y	Y	Y
9. Cole's Levee Rd. II ('11)	Y	Y	Y	Y	Y	Y	Y	Y
10. Olen Avenue ('11)	N	N	N	N	N	N	N	N
11. Valley Street Field ('08, '09)	N	N	N	N	N	N	N	N
NE Bakersfield								
12. Across CALM ('11)	Y	Y	N	N	Y	Y	N	N
13. Ant Hill Oil Field ('08, '09, '11)	Y	Y	Y	N	Y	Y	Y	N
14. Round Mt. Rd. I ('08, '09)	Y	Y	Y	N	Y	Y	Y	N
15. Round Mt. Rd. II ('08, '09)	Y	Y	N	N	Y	Y	N	N
16. Sharktooth hill 1	Y	Y	Y	Y	Y	Y	Y	Y
17. Sharktooth hill 2	Y	Y	Y	Y	Y	Y	Y	Y
18. Sharktooth hill 3 ('11)	Y	Y	Y	Y	Y	Y	Y	Y
NW Bakersfield								
19. Acari Rd. ('11)	N	N	N	N	N	N	N	N
20. Elementary Lne. ('11)	N	N	N	N	N	N	N	N
21. Beech Str. ('11)	N	Y	N	Y	N	Y	N	Y
Wasco								
22. Gun Club Rd. ('11)	Y	Y	Y	Y	Y	Y	N	Y
23. McCoy Rd. ('11)	Y	Y	Y	Y	Y	N	Y	Y
Arvin								
24. Di Giorgio Rd. ('11)	N	Y	N	N	N	Y	N	N
25. Bear Mt. Rd. ('11)	Y	N	N	N	N	Y	N	N
Fraction of area covered by class (%)	35	42	24	28	32	39	22	26

(Y = in class [indicated in bold], N = not in class).
 nd* = not determined in this study.
 nd** = not determined in this study, but confirmed as growth site by Swatek (1970).
 growth site* = sites where *C. immitis* was detected at least twice in a deeper soil layer during the late winter/spring (February-May).
 accumulation site* = the pathogen could only be detected on the surface of the sampling site and never in a deeper soil layer over a several year period.
 negative site* = the pathogen could not be detected in any of the soil samples using the multiplex PCR method as described in this study.
 doi:10.1371/journal.pone.0111921.t002

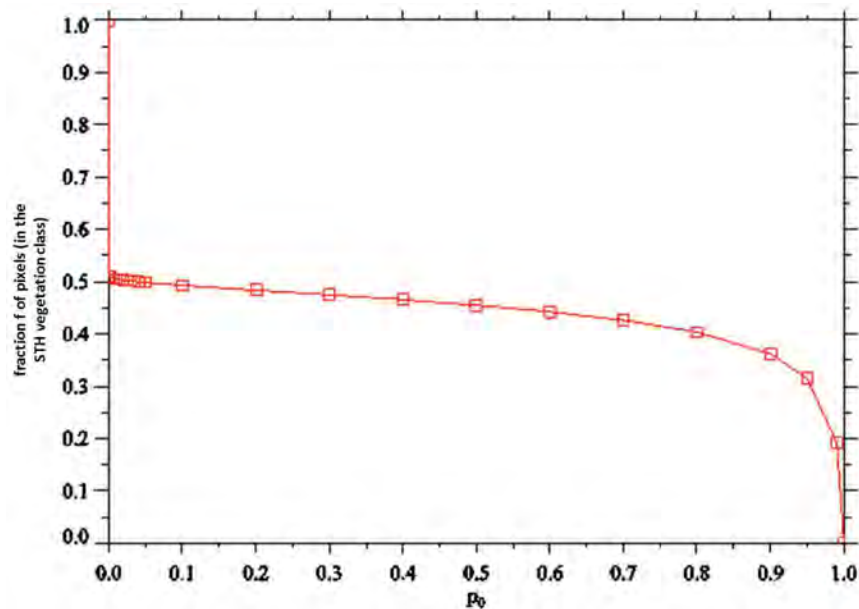


Figure 3. Plot of the fraction f of pixels in the STH-vegetation class vs. the threshold value p_0 . Pixels whose probability of being in the STH-vegetation class is $p < p_0$ are left unclassified. Pixels with $p \geq p_0$ are put in the class. In this plot, $f = 0.51$ for $p_0 = 10^{-4}$, and $f = 1.0$ for $p_0 = 10^{-5}$. doi:10.1371/journal.pone.0111921.g003

nucleotide variability. Amplified ITS fragments were extracted from the 2% Agarose Gel, extracted with the Zymo Clean Gel DNA Recovery kit (ZymoResearch, Irvine, CA), and subsequently sequenced to confirm the presence of *C. immitis*. Extracted DNA from a *C. immitis* isolate (M39), obtained from the Laboratory of Medical Mycology at the Universidad Nacional Autónoma de México was used as positive control. Negative controls and positive controls were included in all PCR's to detect contamination and to verify the amplification of a PCR product of the desired size.

Sites where *C. immitis* was detected at least twice in a deeper soil layer during the late winter/spring (February–May) when the soil is moist and the soil temperature increased were referred to as 'growth sites' of the pathogen in this study, assuming that the soil parameters likely supported the growth of the fungus and thus, the pathogen could be detected consecutively over a several year period in the same location, over several growth seasons. Based on the definition provided by Fisher et al. [31], growth sites are sites where physical, chemical, and biological conditions are suitable for completion of the entire growth cycle required by the organism. Thus, it could be assumed that if the pathogen finds supportive environmental conditions, it would likely expand into deeper soil layers, and not just remain on the surface which can be more hostile due to desiccation and increased uv-radiation. In fact, the majority of the soil samples that contained the pathogen in deeper soil layers also contained the pathogen in surface layers. To the contrary, sites were termed 'accumulation sites' in this study when the pathogen could only be detected occasionally on the surface of the sampling site and never in a deeper soil layer over a several year period. This made it likely that arthroconidia had been transported to this location by the wind, but the pathogen was never able to complete its life cycle because of non-supportive environmental conditions. 'Accumulation sites' were also never positive in consecutive years in contrast to 'growth sites'. Fisher et al. [31] defined 'accumulation sites' as sites where arthroconidia of *Coccidioides* may have been deposited on or near the soil surface after being transported from growth sites by wind, water,

organisms, or anthropogenic means. We are aware that we did not investigate the activity of the pathogen in the soil or verify its growth, and that finding the pathogen in the surface layer of the soil does not mean that it cannot grow there at all. Therefore, we have to consider that some of our results might have been false negatives.

Results

Remote Sensing Approach

A false color map of our ROI for April 28, 2008 was generated and is presented in figure 1, with indication of all sampling sites. Sites which were similar in vegetation to site STH, a confirmed growth site of *C. immitis*, were indicated in yellow, whereas sites that are characterized by different vegetation types appeared in various shades of green and red (agricultural fields, housing developments with gardens, higher elevated mountain slopes etc.). Results by Landsat imagery indicated large areas west of Bakersfield as potential growth sites of the pathogen, in addition to the STH area east of Bakersfield. The city of Taft southwest of Bakersfield was completely surrounded by vegetation that is similar to the vegetation type that characterizes STH. Landsat imagery furthermore indicated small pockets of potential growth sites of *C. immitis* scattered throughout the Southern San Joaquin Valley and around and within the city of Bakersfield. Overall, the yellow colors indicate that about 15% of the landscape visible in the satellite image was covered with vegetation that has the same reflection pattern as the STH vegetation.

We also applied Landsat imagery to an area northwest of Bakersfield where two prisons are located near the cities of Avenal and Coalinga (Kings County and Fresno County) (Fig. 2). In this area, the incidence of coccidioidomycosis has been observed to be large among prison inmates, so one might hypothesize that *C. immitis* could be present in the neighboring environments. And indeed, yellow areas in the immediate neighborhood of the prisons, as presented by Landsat imagery, indicated the presence of potential growth sites of the pathogen.

Table 3. Probability that the sites fall in the STH-thermal class, as predicted by Landsat data.

sampling sites and year sampled	n = 3			n = 2				
	4/20/08	4/23/09	4/26/10	4/29/11	4/20/08	4/23/09	4/26/10	4/29/11
Bakersfield city								
1. CSUB Children Center ('08, '09)	N	N	N	N	N	N	N	N
2. Belle Terrace/P Str. ('11)	N	N	Y	Y	N	N	N	Y
3. Belle Terrace/Gay Str. ('11)	N	Y	Y	N	N	Y	Y	N
4. Marella Way ('11)	N	N	N	N	N	N	N	N
5. Flood Plain CSUB ('08, '09)	N	N	N	N	N	N	N	N
SW Bakersfield								
6. Bike Path West ('08, '09)	N	Y	Y	Y	N	N	N	N
7. Lake Webb ('08, '09)	N	N	N	N	N	N	N	N
8. Cole's Levee Rd. I ('08, '09, '11)	N	Y	Y	Y	N	Y	N	Y
9. Cole's Levee Rd. II ('11)	N	Y	Y	N	N	Y	Y	N
10. Olen Avenue ('11)	N	N	N	N	N	N	N	N
11. Valley Street Field ('08, '09)	N	N	Y	N	N	N	N	N
NE Bakersfield								
12. Across CALM ('11)	Y	N	Y	N	Y	N	N	N
13. Ant Hill Oil Field ('08, '09, '11)	Y	Y	Y	N	Y	Y	N	N
14. Round Mt. Rd. I ('08, '09)	Y	Y	Y	N	Y	Y	Y	N
15. Round Mt. Rd. II ('08, '09)	Y	Y	Y	N	Y	Y	N	N
16. Sharktooth hill 1	Y	Y	Y	Y	Y	Y	Y	Y
17. Sharktooth hill 2	Y	Y	Y	N	Y	Y	N	N
18. Sharktooth hill 3 ('11)	Y	Y	Y	N	Y	Y	N	N
NW Bakersfield								
19. Acari Rd. ('11)	N	N	N	N	N	N	N	N
20. Elementary Lne. ('11)	N	N	N	N	N	N	N	N
21. Beech Str. ('11)	N	Y	Y	N	N	Y	Y	N
Wasco								
22. Gun Club Rd. ('11)	N	N	Y	Y	N	N	Y	Y
23. McCoy Rd. ('11)	Y	Y	Y	Y	Y	N	Y	Y
Arvin								
24. Di Giorgio Rd. ('11)	Y	Y	Y	Y	N	Y	Y	Y
25. Bear Mt. Rd. ('11)	N	N	N	N	N	N	N	N
Fraction of area covered by class (%)	35	42	24	28	32	39	22	26

(Y = in class [indicated in bold], N = not in class).
 nd* = not determined in this study.
 nd** = not determined in this study, but confirmed as growth site by Swatek (1970).
 doi:10.1371/journal.pone.0111921.t003

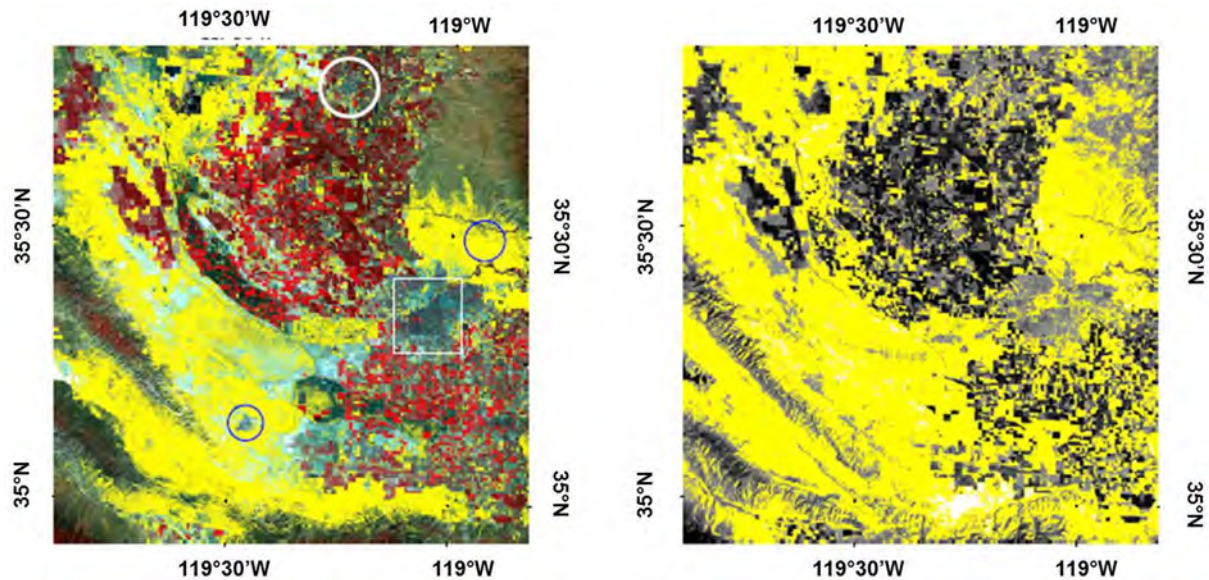


Figure 4. Left: False color image of the ROI on April 20, 2008. Yellow pixels indicate locations in the STH-vegetation class. $p_0=0.95$ and $f=0.32$. The square denotes the location of the city of Bakersfield, the circle on the top indicates the city of Delano, the circle on the right indicates the location of STH, and the circle on the left indicates the location of the city of Taft. **Right:** Spectral class comparison. STH-thermal class is shown in yellow for the same April 20, 2008 image. Parallelepiped scheme was used with thresholds $\bar{x} \pm 2\sigma$, with $\bar{x} (=36.4^\circ\text{C})$ the average surface temperature on the STH training pixels, and $\sigma (=1.9^\circ\text{C})$ the corresponding standard deviation.
doi:10.1371/journal.pone.0111921.g004

Overall, 4 false color maps were generated for our ROI showing results for April 2008 to April 2011 (one for each April, see Table 2). For each satellite picture we obtained one STH vegetation profile. Therefore, it did not matter if variation in the vegetation occurred. The April profiles were considered the most definitive for our work, because in early spring, the climate (soil and air temperature and humidity) still support the growth of the vegetation, and grasses and herbs which are characteristic for the STH-vegetation profile have not dried up yet, compared to the summer months. A validation of our approach is shown in figure 3. In this figure, the corresponding plot of f vs. p_0 is presented. This figure also presents the dependence of the fraction f on p_0 . It can be pointed out that when p_0 drops from 1, f changes from zero to 0.36 at $p_0=0.90$, but then increases slowly with decreasing p_0 until $p \approx 0.04$, where $f \approx 0.50$, and jumps to $f=1$ for $p_0=10^{-5}$. Most likely, this is due to the STH-vegetation class being quite distinct from all other possible spectral classes in the ROI, with a large distance (in pixel space) from those classes. Otherwise, discrete increases in f with decreasing p_0 would be expected as other surface types get merged into the STH-vegetation class.

As a further consistency check, we also wanted to examine the extent to which the STH-vegetation and STH-thermal classes overlapped and if growth sites of the pathogen could be predicted by soil thermal data (tables 2 and 3, figure 4). Thus, we obtained the STH-thermal class by implementing a parallelepiped scheme as described before (see methods). For $n=1$, only sites 13, 14, 16 and 21 were included in the STH-thermal class (April 2008, data not shown). Sites 8, 9, 12–18, 21, and 22–24 were added when $n=2$. Site 11 was included when $n=3$. Site 25 (one of the strongest growth sites of the pathogen) was never included. Figure 4 (right) shows our results for $n=2$. We present this figure here because site 8, which we identified as a strong growth site of the pathogen, came into the STH-thermal class for this value of n (but site 8 was not in the class for $n=1$). By evaluating the agreement between satellite imagery (STH-vegetation class and

STH-thermal class, data from 4 consecutive years), we found that both data sets disagreed in 12% (sites 6, 11 and 25). Almost all sites that fell into the STH-vegetation class also fell into the STH-thermal class (see tables 2 and 3).

Soil series and soil parameters

By using the soil series extent mapping tool, we found that the soil series and soil groups in which the pathogen was detected around Bakersfield, California, belonged to the Garces (Natravid, sites CLR, Bear Mt. Rd.), Chanac (Haploxerept, site AHOF), and Pleito (Haploxeroll, sites STH1 and 2 and 3) series. These soil series are not restricted to the Southern San Joaquin Valley. See figure 5 for a distribution of these soil series in California. Soils that belonged to the Chanac soil series can also be found in western Arizona and southern Nevada. All soils were of mixed mineralogy, had a superactive cation exchange capacity, and were thermic soils with predominantly fine loamy particles. Soils that belonged to these soil series are among the dominant soils in the Southern San Joaquin Valley, especially Kern County and Kings County, but can also be found in northern and western California. The use of software such as the USDA websoilsurvey database, as well as tools available at the Center of Environmental Informatics (CEI) have been found to be very valuable in obtaining information about physical and chemical parameters of soils that could support the growth of *C. immitis*. Detailed information about soil type, landform, dominant parent material of the soil, as well as soil physical and chemical parameters are listed for all sampling sites in table 4. Using these tools, information about land use, vegetation, mean annual soil temperatures, and geographic setting was accessed as well and is summarized in table S1 in file S1.

Detection of *C. immitis* by multiplex PCR

In addition to the two growth sites of the pathogen that were detected in 2008 and 2009 (Cole's Levee Rd. [CLR], Ant Hill Oil

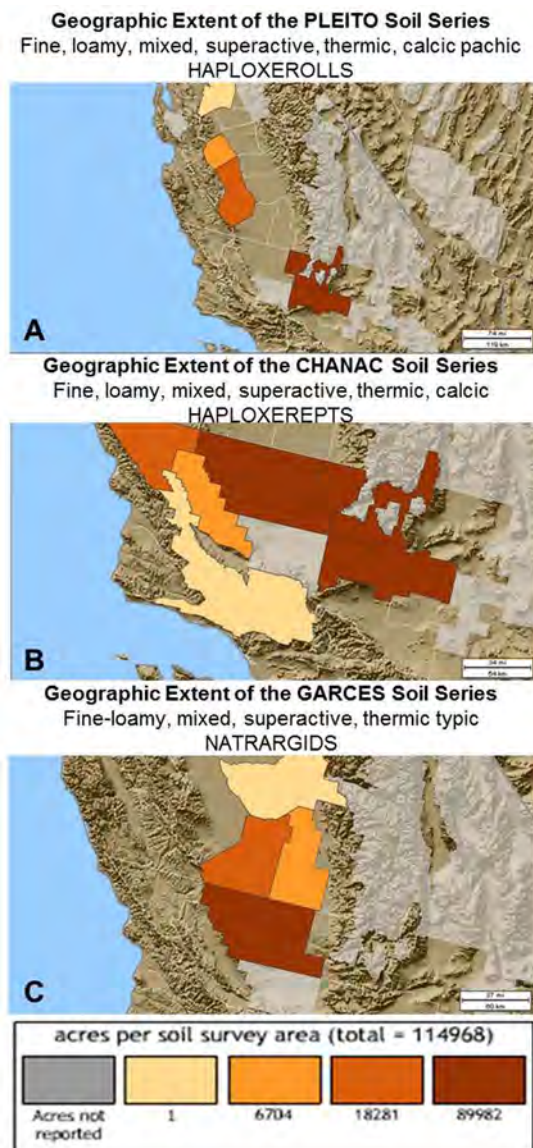


Figure 5. Extend of soil series in the San Joaquin Valley, CA, which can support the growth of *C. immitis*. A: Pleito (brown: SE and NE Kern County, dark orange: W Fresno County, light orange: W Merced County, tan: San Joaquin County) B: Chanac (brown: SE, NE and NW Kern County, dark orange: San Luis Obispo County [Paso Robles area], light orange: San Luis Obispo County, [Carrizo Plains]), and C: Garces soil series (brown: NW Kern County, dark orange: Kings County, light orange: W Tulare County, tan: E Fresno Area), Center for Environmental Informatics at Pennsylvania State University (CEI), <http://www.cei.psu.edu/soiltool/semtool.html>. doi:10.1371/journal.pone.0111921.g005

Field [AHOF], see [32]), we were able to detect additional “hot spots” of the pathogen in 2011. These sites were located within Bakersfield city, in the southwest, northeast and northwest of Bakersfield, and near Arvin, California (see table 1). Sites where the pathogen was detected more than once in a deeper soil layer were considered growth sites, whereas sites where the pathogen was detected occasionally in the surface layer only were considered accumulation sites. Sites where *C. immitis* was never detected were considered negative sites and included areas within Bakersfield city, an area northwest of Bakersfield, and 2 sites near Wasco, California. Fungal DNA could be detected in all soil samples. Of

all sites investigated in 2011 (two growth sites investigated in 2008/09 [CLR and AHOF], and 14 new sites, out of 16 sites altogether for 2011), 4 sites (25%) were found negative, and 12 sites (75%) were confirmed as growth sites of the pathogen. No new accumulation sites were discovered in 2011. The site at Bear Mt. Road was the strongest growth site of *C. immitis* for the 2011 sampling set (positive for *C. immitis* from Jan–Apr). For an example of multiplex PCR results, see figure 6.

Correlation between Landsat imagery and multiplex PCR results

By comparing results obtained by satellite imagery (STH-vegetation class) and multiplex PCR, we found that in ~74% (17 out of 23 tested sites) the satellite imagery results and the results obtained by multiplex PCR agreed at least in one year out of four years ($p_0 = 0.90$). When $p_0 = 0.95$, the agreement was ~70% (16 sites). When satellite imagery based on STH-thermal class was compared with multiplex PCR results, we found that both methods agreed only in 61% ($n = 3$) or 65% ($n = 2$) (table 5). Tables 2 and 3 show the probability that the sites fall in the ‘*C. immitis* growth area’ based on Landsat data in comparison to results obtained by multiplex PCR. We set Red, Green and Blue (RGB) to TM bands 4, 3, and 2 respectively. With this choice, the different depths of red indicated different plant associations. These maps were the result of implementing the MLC method with $p_0 = 0.90$ and $p_0 = 0.95$. Two of the three sites at STH listed in table 1 were confirmed growth sites of *C. immitis*. STH site 2 was confirmed as a growth site by Frank Swatek (Fisher FS, personal communication based on [30]), and STH site 3 was confirmed as a growth site by multiplex PCR in this study. Sampling site 8 (Cole’s Levee Rd. I), which was determined as a strong growth site of the pathogen by multiplex PCR in every year, became included in the ‘*C. immitis* growth area’ based on Landsat data when p_0 was reduced to 0.95. Sampling site 7 (Lake Webb, accumulation site, located less than 1 mile west of CLR) was added when p_0 was reduced to 0.10. Sampling sites 1, 5, 6, and 11, (near Children Center, Flood Plain, Bike Path West, and Valley Street Field) never got added for $p_0 > 10^{-5}$. This was consistent with results obtained by multiplex which confirmed the absence of the pathogen (site 6, negative site), or which detected the pathogen occasionally in surface samples only (sites 1, 5 and 11). Sites, 1, 5 and 11 were termed accumulation sites, where the arthroconidia had been likely transported to by the wind, and where the presence of the pathogen could not be detected in deeper layers by multiplex PCR. We interpret this to mean that STH was quite representative of the *C. immitis* ecological niche within our ROI. However, in some occasions the prediction made by satellite imagery to indicate soils that could potentially harbor the pathogen could not be confirmed by multiplex PCR. Of all 25 sites included in this study, only sites 8 and 9 (Cole’s Levee Rd. I and II) fell in the STH-vegetation class in each year when $p_0 = 0.90$. These sites were confirmed as positive for *C. immitis* by multiplex PCR. Other sites that were confirmed as growth sites of the fungus by our culture independent approach fell in this class at least on one occasion out of four when $p_0 = 0.90$ (sites 2, 3 [Belle Terrace/P Str. and Belle Terrace/Gay Str.], 12 [Across CALM], 13 [AHOF], 21 [Beech Str.], 24 [Di Giorgio Rd.], and 25 [Bear Mt. Rd.]). These sites were still included in the STH-vegetation site when p_0 was increased to $p_0 = 0.95$, with the exception of site 25. Of all sites that were found to be *C. immitis* growth sites by multiplex PCR, two sites were never indicated as a potential growth site by the MLC method (site 10 [Olen Ave.] and site 20 [Elementary Lne.]), but the pathogen was present in soil samples from both sites as

Table 4. Detailed physical and chemical information obtained from the USDA websoilsurvey database for all sites included in this study.

soil parameters	sampling sites					
	Elementary Lne.	across CALM Ant Hill Oil Field	Bear Mt. Rd. Di Georgio Rd. Olen Ave. Cole's Levee Rd.	Sharktooth hill	Belle Terrace/Gay Str. Belle Terrace/P Str. Marella Way	McCoy Rd. Gun Club Rd. Acari Rd. Beech Str.
soil type	Panoche clay loam	Chanac clay loam	Garces loam	Pleito-Trigo-Chanac complex	Kimberlina-Urban land Cajon complex	Garces silt loam
landform	alluvial fans	fan remnants	Alluvium derived from granitoid	Fan remnants, stream terraces	alluvial fans	ridges on basin floors
parent material	alluvium derived from igneous and sedimentary rock	alluvium derived from mixed	alluvium derived from granitoid	Alluvium derived from mixed	alluvium derived from igneous and sedimentary rock	alluvium derived from granite
(map unit symbols)	211	130/131	180	205	180	156
Physical parameters						
Surface texture	clay loam	clay loam	clay loam	clay loam	loamy sand	silt loam
% clay	31	31	25.5	30	12	26.8
% sand	35.4	35.4	38	33.5	71.3	34.2
% silt	33.6	33.6	36.5	36.5	16.7	39.1
Available water capacity (cm/cm)	0.17	0.17	0.21	0.16	0.12	0.11
Available water supply (0–25 cm)	4.25	4.25	5.04	3.69	2.64	2.7
Organic matter	0.25	0.75	0.98	1.5	0.75	0.06
Water content (15 bar)	18.9	18.2	16.7	17.2	8.7	16.2
Water content (1/3 bar)	32	30.1	30.9	27.8	17.7	30.2
Sat. hydraulic conductivity (Ksat) (micrometers/s)	9	9	8.37	2.82	28	0.8362
Chemical parameters						
pH	7.9	7.9	8.5	7.8	7.5	8.9
CaCO ₃	3	3	3	0	3	3
Cation Exchange Capacity (CEC7)	15	24.4	20.6	24.3	7.5	13.1
Gypsum	0	0	0	0	0	0
Sodium adsorption ratio (SAR)	0	0	2	0	0	14
Electrical conductivity (EC)	1	0	5	0.5	1	10.2

Indicated in cursive are the parameters which seemed to be most important to distinguish *C. immitis* growth sites from negative sites. doi:10.1371/journal.pone.0111921.t004

confirmed by multiplex PCR (see Discussion). Furthermore, two sites that were indicated as potential growth sites of the pathogen by Landsat imagery at all times when $p_0=0.90$, could not be confirmed by multiplex PCR to harbor the pathogen. These sites were located near Wasco, California (NW of Bakersfield), (sites 22 [Gun Club Rd.] and 23 [McCoy Rd.]).

Changes in extend of areas (km²) that fell into the STH-vegetation class were observed for the sampling period until early 2014 and are displayed in table S2 in file S1. The year with the highest precipitation (2011) had the lowest area of vegetation that belonged into the STH-vegetation class in comparison to the years 2008 and 2009 which were characterized by a significantly reduced amount of precipitation and showed an increased area of vegetation that belonged into the STH-vegetation class (see figure S1).

Discussion

The purpose of our study was to identify soil types in Kern County that could support the growth of *C. immitis* by combining Landsat imagery (based on vegetation and soil temperature), and soil parameter information (from 25 sites) with a culture independent PCR-based method to detect the pathogen. We showed that satellite imagery, combined with soil parameter information, can provide a map of locations within our ROI, where *C. immitis* might reasonably be expected to be found. We were able to verify the presence of the pathogen by a multiplex PCR method in about 74% ($p=0.90$), when soil samples were investigated over a 4 year period. However, for about a quarter of our sites (26%), results obtained by Landsat imagery and multiplex PCR did not correlate. The reasons for this observation could be multifold. Some main factors to be considered are: 1) The amount of *Coccidioides* DNA extracted from the soil might have been under the detection limit of our PCR based methods (sites 22 and

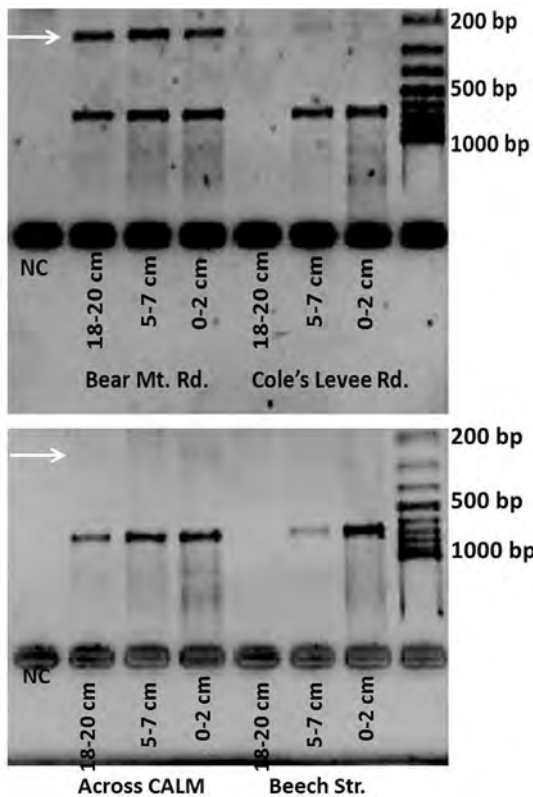


Figure 6. Example of multiplex PCR results. White arrows point on a 223 bp fragment that represents *C. immitis*. Site Bear Mt. Rd. shows the strongest ITS amplicons in all soil layers, whereas sites Cole's Levee Rd. and site Across CALM gave a weaker signal in some soil layers, and site Beech Str. was negative. NC = negative control. Bands that indicate the presence of the pathogen in the 2% Agarose gel were confirmed to origin from *C. immitis* by sequencing.
doi:10.1371/journal.pone.0111921.g006

23), or 2) the resolution of the satellite imagery might not have been detailed enough (site 10, a small site of only 10 m²), and 3) the distribution of *Coccidioides* in the soil might have been spotty, and the positive site was missed (sites that were not positive for the

pathogen in all sampling years). A closer look at sites where satellite imagery and soil parameter data indicated potential growth sites for *C. immitis* also revealed that these sites were not uniform in regard to plant coverage, distribution, and diversity, thus, generating microhabitats for soil microorganisms that most likely would be quiet distinct, especially in and around the rhizosphere [32]. Other factors, such as fluctuation in climate and pollution of the soil might have had an impact on our analyses as well. Furthermore, it has to be considered that *C. immitis* might be able to persist in soils that have been converted to agricultural fields for an unknown amount of time, but its arthroconidia might never germinate and grow into vegetative hyphae. These sites could be termed dormant sites (e.g. site 20, an orchard with young almond trees). To assess these impacts on our results was not the focus of our work, but we are aware of these limitations. In previous research we have investigated the limitation of the multiplex PCR approach to detect *C. immitis*, (see [33] for results of primer efficiency). Briefly, we found that the sensitivity of the diagnostic PCR (ITS primer pair) was reduced compared to the primer pair that amplifies 18S rDNA fragments of all fungi (RDS primer pair).

In previous work [23–25], it was suggested that some environmental fluctuations are a fundamental link missing from coccidioidomycosis statistical modeling schemes. One important aspect to investigate is whether fluctuations in the STH-vegetation class can provide this connection, and be statistically linked to the observed variations in incidence of valley fever. In this regard, one effect to consider is the extent to which this RS approach continues to be valid through the seasons. In the spring, when plants are blooming, the different vegetation types have different spectral signatures. As the weather dries and plants wither, the spectral signatures of the relevant vegetation types may become less distinct. Thus, the vegetation on STH may not be as good a marker for *C. immitis* in the fall, as it is in the spring. The implicit assumption in this study is that the STH environment is the only type of environment which harbors *C. immitis* within the San Joaquin Valley area of Kern County. We presented in this paper arguments to support this assumption; nevertheless, it would be useful to find more similarly suitable test sites to further corroborate our findings, or to find slightly different ecotypes that support *C. immitis*, beside of those detected in this study.

Table 5. Agreement between multiplex PCR and MLC for the STH vegetation class and the STH-thermal class to predict growth sites of *C. immitis* (to agree a prediction by either multiplex PCR or MLC must be confirmed at least once for the four years by the other method).

	STH-vegetation class	
	$p_0=0.90$	$p_0=0.95$
multiplex PCR and MLC agree	17 (74%)	16 (70%)
multiplex PCR predicts growth site and MLC disagrees	2 (9%)	3 (13%)
MLC predicts growth site and multiplex PCR disagrees	4 (17%)	4 (17%)
	STH-thermal class	
	n = 3	n = 2
multiplex PCR and MLC agree	14 (61%)	15 (65%)
multiplex PCR predicts growth site and MLC disagrees	3 (13%)	4 (17.5%)
MLC predicts growth site and multiplex PCR disagrees	6 (26%)	4 (17.5%)

From altogether 25 sites, only 23 were considered, because no multiplex PCR results were obtained for STH sites I and II.
doi:10.1371/journal.pone.0111921.t005

We also observed changes in the extent of the STH-vegetation class over time. A comparative analysis of precipitation between 2008 and 2011 (up to early 2014) suggest that years with a reduced precipitation (drought) favor plants of the STH-vegetation class, but other factors likely play a role as well, such as development and changes in land use (see figure S1 and table S1 in File S1), which was not assessed in this study.

Compared to the STH-vegetation class data, the STH-thermal data showed considerably more variation for the four different years, as expected. The vegetation on a certain day in each year may be very similar, but soil temperatures might be more variable in different years (data for $n=2$ and $n=3$ can be seen in table 3, no data is shown for $n=1$). Other strong growth sites of the pathogen (sites 8, 9, and 13) were also not consistently included in all years, not even with $n=3$. It should also be noted that sites 6 (negative site) and 11 (accumulation site) were never included into the STH-vegetation class by satellite imagery, but were included in the STH-thermal class when $n=3$. We concluded therefore, that the STH-thermal classes alone might not be sensitive enough to predict growth sites of *C. immitis*. Site 25 was never included (thermal class) maybe because of the limited resolution of the satellite imagery, as discussed earlier. It is important to keep in mind that the TM-6 image tells us surface temperatures. It may very well be that what matters is the temperature below the surface [31]. For our ROI, all landcovers were similar on the macroscale; therefore, apparent temperatures were appropriate for comparison purposes.

To improve the value of satellite imagery data, the actual spectral reflectance profiles of various soil components could be included to complement the satellite data (for details see <http://www.africasoils.net/data/lds-description>) in future studies. A time series analysis could also be considered, if feasible. Phenology development throughout the year can make the analysis more specific to a particular vegetation type. Niche modeling rather than automated classification could be considered as well to obtain a richer output that indicates variables of importance. However, a large dataset would be necessary that would include presence and also absence data of the pathogen in a certain type of soil at a certain time with presence or absence of a certain type of vegetation. Furthermore, it should be considered that broad band signatures over larger geographic areas and ecotones might not be precise enough to be useful in predicting growth sites of a pathogen, especially when the pathogen could be adapted to grow in a variety of different ecosystems.

Our results indicated that strong growth sites of the pathogen were likely associated with 3 different USDA soil map units (180, 131, and 205), which were all loamy sands. Several sites around Bakersfield, California, that fell into one of these map units were indeed growth sites of *C. immitis*, as confirmed by multiplex PCR, and were similar in vegetation compared to the STH area. These types of soils are not restricted to the Southern San Joaquin Valley, but can be found in other areas of California as well. One could hypothesize that with a drier and warmer climate, as it is predicted for California in the near future [51,52], *C. immitis* might be able to expand its current range. In our study, we focused on soil samples from only one County, the above mentioned Kern County in the Southern San Joaquin Valley of California, a highly endemic area for *C. immitis*. The soil types investigated here did not comprise all types that can be found in our ROI. Even though Kern County is a hot spot of *C. immitis* with the highest incidence of coccidioidomycosis documented for as long as incidence data is

recorded in California, we cannot conclude that soils that predominate in this area are the ones that also predominantly support the growth of the pathogen. A more rigorous sampling framework should be attempted in the future that would include locations beyond Kern County covering as wide a range of habitats as possible to correctly determine growth sites of *C. immitis*, as well as determining sites that are not supporting the growth of the pathogen. Developing such a sampling plan should include stratification, replicate sampling, and determination of important chemical and physical soil parameters, including investigations in other countries where coccidioidomycosis occurs would be of value as well. The ultimate goal would then be to generate a U.S. or America-wide database of occurrence and absence of *Coccidioides* spp. Such a database could be useful for characterizing the ecological niche for both *Coccidioides* species, and could indicate a variety of supporting ecosystems, as well as being an advisory public health tool, to reduce incidence of coccidioidomycosis in Kern County and elsewhere.

In conclusion, the combination of the methods used in our research can be used to generate maps that indicate potential growth sites of *C. immitis*, and thus serve as a tool to further investigate the ecological niche occupied by the pathogen in the Southern San Joaquin Valley and beyond in more detail. Recent advances in computer processing and geographic information system and global positioning system technologies facilitate integration of remote sensing data, such as environmental parameters with disease incidence data, so that models for disease surveillance and control can be developed [53,54].

Supporting Information

Figure S1 Cumulative monthly precipitation (inches) over time for the Southern San Joaquin Valley, assembled from 5 stations (Calaveras Big Trees [CVT], Hetch Hetchy [HTH], Yosemite HQ [YSV], North Fork RS [NFR], and Huntington Lake [HNT]) obtained from the California Data Exchange Center at http://cdec.water.ca.gov/snow_rain.html.

(TIF)

File S1 Supporting tables. Table S1. Detailed soil series descriptions of sites which were found to be growth sites of *C. immitis*. **Table S2.** Extend of STH-vegetation class in our ROI between 2008 and 2011 based on satellite imagery.

(DOCX)

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Author Contributions

Conceived and designed the experiments: AL JT. Performed the experiments: AL JT LM JB KC NS. Analyzed the data: AL JT. Contributed reagents/materials/analysis tools: LC KE. Wrote the paper: AL JT LC KE.

References

- Hector RF, Rutherford GW III, Tsang CA, Erhart LM, McGotter O et al. (2011) The public health impact of coccidioidomycosis in Arizona and California. *Int J Environ Res Public Health* 8: 1150–1173.
- Nguyen C, Barker M, Hoover S, Nix DE, Ampel NM et al. (2013) Recent advances in our understanding of the environmental, epidemiological, immunological, and clinical dimensions of coccidioidomycosis. *Clin Microbiol Rev* 26: 505–525.
- Lee RV (1944) Coccidioidomycosis: In the western flying training command. *Cal West Med* 61: 133–134.
- Pappagianis D (1988) Epidemiology of coccidioidomycosis. *Current Topics in Mycology* 2: 199–238.
- Pappagianis D (1994) Marked increase in cases of coccidioidomycosis in California: 1991, 1992, and 1993. *Clin Infect Dis* 19 (Suppl 1), S14–S18.
- Negrón R (2008) Evolución de los conocimientos sobre aspectos clínicos epidemiológicos de la coccidioidomycosis en las Américas. *Rev Argent Microbiol* 40: 246–256.
- Fisher MC, Koenig GL, White TJ, San-Blas G, Negrón R et al. (2001) Biogeographic range expansion into South America by *Coccidioides immitis* mirrors new world patterns of human migration. *Proc Nat Acad Sci* 98: 4558–4562.
- Fisher MC, Koenig GL, White TJ, Taylor JW (2002) Molecular and phenotypic description of *Coccidioides posadasii* sp. nov., previously recognized as the non-California population of *Coccidioides immitis*. *Mycologia* 94: 73–84.
- Neafsey DE, Barker BM, Sharpton TJ, Stajich JE, Park DJ et al. (2010) Population genomic sequencing of *Coccidioides* fungi reveals recent hybridization and transposon control. *Genome Res* 20: 938–946.
- Comrie AC, Glueck MF (2007) Assessment of climate coccidioidomycosis model: Model sensitivity for assessing climatologic effects on the risk of acquiring coccidioidomycosis. *Ann NY Acad Sci* 1111: 83–95.
- Kolivras KM, Johnson PS, Comrie AC, Yool SR (2001) Environmental variability and coccidioidomycosis (valley fever). *Aerobiologia* 17: 31–42.
- Smith CE, Beard RR, Rosenberger HG, Whiting EG (1946) Effect of season and dust control on coccidioidomycosis. *J Am Med Assoc* 132: 833–838.
- Hughenoltz PG (1957) Climate and coccidioidomycosis. In: *Proceedings of symposium on coccidioidomycosis*, Phoenix, AZ. Public Health Service, Publication no. 575. Atlanta: US Public Health Service, pp. 136–43.
- Maddy KT (1957) Ecological factors possibly relating to the geographic distribution of *Coccidioides immitis*. In: *Proceedings of the Symposium on Coccidioidomycosis* (pp. 144–157). Communicable Disease Center, Atlanta, GA. PHS Pub. No. 575.
- Pappagianis D, Einstein H (1978) Tempest from Tachachi takes toll or *Coccidioides* conveyed aloft and afar. *West J Med* 129: 527–530.
- Jimadu BA, Welch G, Talbot R, Caldwell J, Johnson R et al. (1994) Update: coccidioidomycosis in California 1991–1993. *MMWR* 43: 421–423.
- Mosley D, Komatsu K, Vaz V, Vertz D, England B et al. (1996) Coccidioidomycosis in Arizona 1990–1995. *MMWR* 45: 1069–1073.
- Kirkland TN, Fierer J (1996) Coccidioidomycosis: A reemerging infectious disease. *Emerg Infect Dis* 2: 192–199.
- Schneider E, Hajjeh RA, Spiegel RA, Jibson RW, Harp EL et al. (1997) A coccidioidomycosis outbreak following the Northridge, Calif. earthquake. *J Am Med Assoc* 277: 904–908.
- Komatsu K, Vaz V, McRill C, Colman T, Comrie A et al. (2003) Increase in coccidioidomycosis in Arizona 1998–2001. *MMWR* 52: 109–112.
- Kolivras KM, Comrie AC (2003) Modeling valley fever (coccidioidomycosis) incidence on the basis of climate conditions. *Int J Biometeor* 47: 87–101.
- Comrie AC (2005) Climate factors influencing coccidioidomycosis seasonality and outbreaks. *Environ Health Perspect* 113: 688–692.
- Zender CS, Talamantes J (2006) Climate controls on valley fever incidence in Kern County, California. *Int J Biometeorol* 50: 174–182.
- Talamantes J, Behseta S, Zender CS (2007a) Fluctuations in climate and incidence of coccidioidomycosis in Kern County, California: a review. *Ann NY Acad Sci* 1111: 73–82.
- Talamantes J, Behseta S, Zender CS (2007b) Statistical modeling of valley fever data in Kern County, California. *Int J Biometeorol* 51: 301–315.
- Tamerius JD and Comrie AC (2011) Coccidioidomycosis incidence in Arizona predicted by seasonal precipitation. *PLOS One* 6: 1–7.
- Cayan D, Maurer E, Dettinger M, Tyree M, Hayhoe K (2008) Climate change scenarios for the California region. *Climate Change* 87: 21–42.
- Greer A, Ng V, Fisman D (2008). Climate change and infectious diseases in North America: the road ahead. *CMAJ* 11: 178–186.
- Marsden-Haug N, Goldoft M, Ralston C, Limaye AP, Chua J et al. (2013) BRIEFREPORT - Coccidioidomycosis acquired in Washington State. *CID* 2013: 56.
- Swatek FE (1970) Ecology of *Coccidioides immitis*. *Mycopath Mycol Applic* 40: 3–12.
- Fisher FS, Bultman MW, Johnson SM, Pappagianis D, Zaborsky E (2007) *Coccidioides* niches and habitat parameters in the southwestern United States: a matter of scale. *Ann NY Acad Sci* 1111: 47–72.
- De Boer, Folman LB, Summerbell RC, Boddy L (2005) Living in a fungal world: impact of fungi on soil bacterial niche development. *FEMS Microbiol Rev* 29: 795–811.
- Lauer A, Baal JCH, Baal JDH, Verma M, Chen JM (2011). Detection of *Coccidioides immitis* in Kern County, California, by multiplex PCR. *Mycologia*. doi:10.3852/11-127.
- Merriam CH (1898) Life zones and crop zones of the United States. Bulletin 10 Division of Biological Survey, United States Department of Agriculture. Washington, DC.
- Maddy KT (1958) The geographic distribution of *Coccidioides immitis* and possible ecologic implications. *Ariz Med* 15: 178–188.
- Maddy KT (1959) Coccidioidomycosis in animals. *Vet Med* 54: 233–242.
- Baptista-Rosas RC, Catalan-Dibene J, Romero-Olivares AL, Hinojosa A, Cavazos T et al. (2012) Molecular detection of *Coccidioides* spp. form environmental samples in Baja California: linking Valley Fever to soil and climate conditions. *Fung Ecol* 5: 177–190.
- Barker BM, Tabor JA, Shubitz L, Perrill R, Orbach MJ (2012) Detection and phylogenetic analysis of *Coccidioides posadasii* in Arizona soil samples. *Fungal Ecol* 5: 163–176.
- Zak DR, Holmes WE, White DC, Peacock AD, Tilman D (2003) Plant diversity, soil microbial communities, and ecosystem function: Are there any links? *Ecology* 84: 2042–2050.
- Nannipieri P, Ascher J, Ceccherini MT, Landi L, Pietramellara G, et al. (2003) Microbial diversity and soil function. *Eur J Soil Sci* 54: 655–670.
- Sharpton TJ, Stajich JE, Rounsley SD, Gardner MJ, Wortman JR et al. (2009) Comparative genomic analyses of the human fungal pathogens *Coccidioides* and their relatives. *Genome Res*. doi:10.1101/gr.087551.108.
- Egeberg RO, Ely F (1956) *Coccidioides immitis* in the soil of the southern San Joaquin Valley. *Am J Med Sci* 231: 151–154.
- Rogers DJ, Randolph SE, Snow RW, Hay SI (2002) Satellite imagery in the study and forecast of malaria. *Nature* 415: 710–715.
- Koelle K, Rodó X, Pascual M, Yunus M, Mostafa G (2005) Refractory periods and climate forcing in cholera dynamics. *Nature* 436: 696–70.
- Rogers DJ (2000) Satellites, space, time, and the African trypanosomiasis. *Adv Parasitol* 47: 128–171.
- Goetz S, Prince S, Small J (2000) Advances in satellite remote sensing of environmental variables for epidemiological applications. *Adv Parasitol* 47: 289–307.
- Greene DR, Koenig G, Fisher MC, Taylor GW (2000) Soil isolation and molecular identification of *Coccidioides immitis*. *Mycologia* 92: 406–410.
- Kemp R (1974) The distribution of *Coccidioides immitis* at Sharktooth hill, Oildale, California [MS Thesis]. Long Beach, California: California State College. 62 p.
- Richards JA, Jia X (2006) Remote sensing digital image analysis, An Introduction. Springer-Verlag, Germany.
- Chander G, Markham B (2003) Revised Landsat-5 TM radiometric calibration procedures and postcalibration dynamic ranges. *IEEE Trans Geosci Remote Sens* 41: 2674–2677.
- Cayan D, Maurer E, Dettinger M, Tyree M, Hayhoe K (2008) Climate change scenarios for the California region. *Climate Change* 87: 21–42. *Clim Change* 87: 21–42.
- Greer A, Ng V, Fisman D (2008). Climate change and infectious diseases in North America: the road ahead. *CMAJ* 11: 178–186.
- Nuckols JR, Ward MH, Jarup L (2004) Using geographic information systems for exposure assessment in environmental epidemiology studies. *Environ Health Perspect* 11: 1007–1015.
- Craglia M, Goodchild MF, Annoni A, Camara G, Gould M et al. (2008) Next-Generation Digital Earth. A position paper from the Vespucci Initiative for the Advancement of Geographic Information Science. *Int J Spat Data Infrastruct Res* 3: 146–167.

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SS-IAMF#2: SAFETY AND SECURITY MANAGEMENT PLAN

Sixty days after receiving from the Authority a construction notice-to-proceed, the Contractor shall provide the Authority with a technical memorandum documenting how the following requirements, plan, programs and guidelines were considered in design, construction and eventual operation to protect the safety and security of construction workers and users of the HSR. The Contractor shall be responsible for implementing all construction-related safety and security plans and the Authority shall be responsible for implementing all safety and security plans related to HSR operation.

- Workplace worker safety is generally governed by the Occupational Health and Safety Act of 1970, which established the OSHA. OSHA establishes standards and oversees compliance with workplace safety and reporting of injuries and illnesses of employed workers. In California, OSHA enforcement of workplace requirements is performed by California Occupational Safety and Health Administration (Cal OSHA). Under Cal OSHA regulations, as of July 1, 1991, every employer must establish, implement, and maintain an injury and illness prevention program.
- The Authority has adopted a Safety and Security Management Plan to guide the safety and security activities, processes, and responsibilities during design, construction and implementation phases of the project to protect the safety and security of construction workers and the public. A Systems Safety Program Plan (SSPP) and a System Security Plan would be implemented prior to the start of revenue service to guide the safety and security of the operation of the high-speed rail system.
- Prior to Construction, the Contractor shall provide the Authority with a Safety and Security Management Plan documenting how they would implement the Authority's safety and security requirements within their project scope.
- Implement site-specific health and safety plans and site-specific security plans to establish minimum safety and security guidelines for contractors of, and visitors to, construction projects. Contractors would be required to develop and implement site-specific measures that address regulatory requirements to protect human health and property at construction sites.
- Preparation of a Valley Fever action plan that includes: A) information on causes, preventative measures, symptoms, and treatments for Valley Fever to individuals who could potentially be exposed through construction activities (i.e., construction workers, monitors, managers, and support personnel); B) continued outreach and coordination with California Department of Public Health; C) coordination with county departments of public health to ensure that the above referenced information concerning Valley Fever is readily available to nearby residents, schools, and businesses and to obtain area information about Valley Fever outbreaks and hotspots; and D) provide a qualified person dedicated to overseeing implementation of the Valley Fever prevention measures to encourage a culture of safety of the contractors and subcontractors. The Valley Fever Health and Safety (VFHS) designee shall coordinate with the county Public Health Officer and oversee and manage the implementation of Valley Fever control measures. The VFHS designee is responsible for ensuring the implementation of measures in coordination with the county Public Health Officer. Medical information would be maintained following applicable and appropriate confidentiality protections. The VFHS in coordination with the county Public Health Officer would determine what measures would be added to the requirements for the Safety and Security Management Plan regarding preventive measures to avoid Valley Fever exposure. Measures shall include, but are not limited to the following: A) train workers and supervisors on how to recognize symptoms of illness and ways to minimize exposure, such as washing hands at the end of shifts; B) provide washing facilities nearby for washing at the end of shifts; C) provide vehicles with enclosed, air conditioned cabs and make sure workers keep the windows closed; D) equip heavy equipment cabs with high efficiency particulate air (HEPA) filters; and E) make NIOSH approved respiratory protection with particulate filters as recommended by the CDPH available to workers who request them.

- System safety program plans incorporate FRA requirements and are implemented upon Authority approval. FRA's SSPPs requirements would be determined in FRA's new System Safety Regulation (49 CFR 270).
- Rail systems must comply with FRA requirements for tracks, equipment, railroad operating rules and practices, passenger safety, emergency response, and passenger equipment safety standards found in 49 CFR Parts 200-299.
- The HSR *Urban Design Guidelines* (Authority 2011) require implementing the principles of crime prevention through environmental design. The contractor shall consider four basic principles of crime prevention through environmental design during station design and site planning: territoriality (design physical elements that express ownership of the station or site); natural surveillance (arrange physical features to maximize visibility); improved sightlines (provide clear views of surrounding areas); and access control (provide physical guidance for people coming and going from a space). The HSR design includes emergency access to the rail right-of-way, and elevated HSR structure design includes emergency egress points.
- Implement fire/life safety and security programs that promote fire and life safety and security in system design, construction, and implementation. The fire and life safety program is coordinated with local emergency response organizations to provide them with an understanding of the rail system, facilities, and operations, and to obtain their input for modifications to emergency response operations and facilities, such as evacuation routes. The Authority would establish fire/life safety and security committees throughout the HSR section.
- Implement system security plans that address design features intended to maintain security at the stations within the track right-of-way, at stations, and onboard trains. A dedicated police force would ensure that the security needs of the HSR system are met.
- The design standards and guidelines require emergency walkways on both sides of the tracks for both elevated and at-grade sections and the provision of appropriate space as defined by fire and safety codes along at-grade sections of the alignment to allow for emergency response access.
- Implement standard operating procedures and emergency operating procedures, such as the FRA-mandated Roadway Worker Protection Program to address the day-to-day operation and emergency situations that would maintain the safety of employees, passengers, and the public.

RESPONSE TO B-P GCD COMMENT ON VALLEY FEVER

Thank you for the comment and additional information regarding *Coccidioides immitis* (a.k.a., the Valley Fever fungus). This action for which FRA has requested comment is FRA's Draft General Conformity Determination. The General Conformity Determination documents FRA's evaluation of the potential emissions associated with the proposed Bakersfield to Palmdale Section of the California High-Speed Rail (HSR) System, consistent with relevant requirements of the Clean Air Act and implementing regulations. Fugitive dust is responsible for particulate matter pollution. However, FRA's analysis of the potential emissions from the Bakersfield to Palmdale Section found that construction period emissions would not exceed the General Conformity de minimis threshold for particulate matter pollution. Operation of the project would result in an overall reduction of regional emissions of all applicable air pollutants and would not cause a localized exceedance of an air quality standard. The general conformity analysis does not require soil testing for pathogens such as the Valley Fever fungus.

Nonetheless, in considering this comment, FRA consulted with the California High-Speed Rail Authority regarding fugitive dust that contains the Valley Fever fungus. As a part of the environmental impact report (EIR)/environmental impact statement (EIS) prepared to meet the requirements of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), the Authority reviewed the potential of Valley Fever occurrence in the San Joaquin Valley, specifically in the area where HSR construction and operations would occur. As described in its Final EIR/EIS, the Authority, in coordination with the FRA, U.S. Environmental Protection Agency and the California Department of Public Health, has included impact avoidance and minimization features (IAMF) as part of the project to incorporate additional best practices to minimize exposure to those at risk from construction activities disturbing naturally occurring *Coccidioides* spores. Specifically, the Authority will prepare a Valley Fever action plan **SS-IAMF#2: Safety and Security Management Plan**, and measures that mitigate the production and exposure of fugitive dust **AQ-IAMF#1: Fugitive Dust Emissions**. These IAMFs would also reduce risk to the general public of Valley Fever spreading through fugitive dust emissions because these IAMFs would limit the amount of fugitive dust released as a result of construction.

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June 14, 2021

Andrea Martin
Federal Railroad Administration
Office of Railroad Policy and Development
770 L Street Suite 620
Sacramento, CA, 95814

Project: Draft General Conformity Determination for the Bakersfield to Palmdale Project Section

District CEQA Reference No: 20210507

Dear Andrea Martin:

The San Joaquin Valley Unified Air Pollution Control District (District) has reviewed the Draft General Conformity Determination (DGCD) for the project referenced above from the Federal Railroad Administration (FRA). The project consists of implementation of the Bakersfield to Palmdale section of the High Speed Rail system that will total approximately 80 miles in length (Project). The Project is located in Kern County and Los Angeles County. The District offers the following comments:

1) Voluntary Emissions Reduction Agreement (VERA)

The Draft General Conformity Determination states, “Air Quality Mitigation Measure #1 (AQ-MM#1) of the Draft General Conformity Determination indicates that the High-Speed Rail Authority (HSRA) has entered into a Memorandum of Understanding (MOU) with the District by offsetting to net zero the Project’s actual construction emissions of VOC, NOx, PM10, and PM2.5.”

The District appreciates the HSRA ongoing commitment to working with the District and appreciates FRA’s reference of the mitigation measure AQ-MM#1 in the general conformity determination for air quality. The District and HSRA had entered into an MOU on June 19, 2014, which establishes the framework for fully mitigating to net zero construction emissions of NOx, VOC, PM10, and PM2.5 for the entire High-Speed Train Project throughout the San Joaquin Valley Air Basin, which includes this Bakersfield to Palmdale section. For reference, the District has attached a copy of the MOU to this letter.

Samir Sheikh
Executive Director/Air Pollution Control Officer

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34946 Flyover Court
Bakersfield, CA 93308-9725
Tel: (861) 392-5500 FAX: (861) 392-5585

To date, the District and HSRA have worked closely to ensure construction air quality emissions of NOx, VOC, PM10, and PM2.5 are mitigated in accordance with the MOU. This MOU requires the HSRA to enter into a VERA with the District for any segment, or portion located in the San Joaquin Valley Air Basin that has been approved for construction by the HSRA, or any other applicable state or federal entity. The MOU applies to the above referenced Project. Therefore, the District recommends that the HSRA enter in a VERA with the District to fully mitigate to net zero Project construction emissions.

2) **District Comment Letter**

The District recommends that a copy of the District's comments be provided to the HSRA.

If you have any questions or require further information, please contact Eric McLaughlin by e-mail at Eric.McLaughlin@valleyair.org or by phone at (559) 230-5808.

Sincerely,

Brian Clements
Director of Permit Services



John Stagnaro
Program Manager

Enclosure: Memorandum of Understanding between District and HSRA

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MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU") is entered into by the California High-Speed Rail Authority ("Authority") and the San Joaquin Valley Unified Air Pollution Control District ("District"). Authority and District are collectively referred to herein as the "Parties" with each being a "Party".

RECITALS

WHEREAS, District is an air pollution control district formed by the counties of Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus and Tulare, and the Valley portion of Kern, pursuant to California Health and Safety Code section 40150, et seq.; and

WHEREAS, District is responsible for developing and implementing air quality control measures within the District Boundaries as depicted in Exhibit A ("District Boundaries" or "San Joaquin Valley Air Basin") attached hereto and incorporated herein, including air quality control measures for stationary sources, transportation sources, and indirect sources; and

WHEREAS, despite the best efforts of District, air quality within District Boundaries remains impaired such that the San Joaquin Valley Air Basin is not in attainment of federal Clean Air Act standards for ozone and its precursors NOx and VOCs (extreme nonattainment) and PM2.5 and is in Attainment/Maintenance status for PM1 O(NOx, **VOE**, PM1 Oand PM2.5 collectively, "Criteria Pollutants"); and

WHEREAS, emissions of Criteria Pollutants from the Authority's planned high-speed rail construction within District Boundaries would exacerbate that non-attainment status and could threaten that Attainment/Maintenance status; and

WHEREAS, the San Joaquin Valley Air Basin is unique meteorologically in that it is surrounded on three sides by mountain ranges, including to the west which significantly limits the ability of ocean weather patterns and winds to refresh air in the basin; and

1 **WHEREAS**, the Authority, in partnership with the Federal Railroad
2 Administration ("FRA"), is developing a high-speed train system ("HST System"), which
3 includes construction of guide-way segments, and ancillary facilities such as a Heavy
4 Maintenance Facility, stations, and overpasses for California pursuant to the California
5 High-Speed Rail Act (Public Utilities Code section 18500 *et seq.*) ("Rail Act") and the
6 Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century (codified at
7 Streets and Highways Code section 2704 *et seq.*) ("Bond Act") that would serve the
8 San Francisco Bay Area, Sacramento, Central Valley, Los Angeles and San Diego
9 through various station-to-station segments ("Segments") (as depicted in Exhibit B);
10 and

11 **WHEREAS**, the HST System includes segments or portions thereof that will be
12 constructed, if and when funding can be secured, within the boundaries of the San
13 Joaquin Valley ("SJV") including the following: Merced to San Jose (portion), Merced to
14 Fresno (all), Fresno to Bakersfield (all), Bakersfield to Palmdale (portion), and
15 Sacramento to Merced (portion), collectively referred to as "HST SJV District Portion";
16 and

17 **WHEREAS**, the Authority completed Program-level Environmental Impact
18 Statements/Reports ("EIS/EIR") in 2005, 2008, 2010 and 2012 pursuant to the National
19 Environmental Policy Act ("NEPA") and California Environmental Quality Act ("CEQA")
20 evaluating impacts of the HST System, and selecting preferred route corridors; and

21 **WHEREAS**, a project level Final EIS/EIR ("MF FEIR") for the Merced to Fresno
22 Segment ("MF Segment") was approved and certified via Resolution 12-19 ("MF FEIR
23 Resolution") and the MF Segment approved and CEQA findings made via Resolution
24 12-20 ("MF Segment Resolution") by the Authority's Board of Directors in May 2012
25 and FRA's associated Record of Decision ("ROD") issued on September 2012; and

26 **WHEREAS**, construction of a portion of the MF Segment (from approximately
27 Madera to downtown Fresno) is anticipated to commence in 2014 with connections to
28 the San Francisco Bay Area and Los Angeles Basin expected after year 2028; and

1 **WHEREAS**, the Authority found in the MF FEIR and MF FEIR Resolution that
2 construction of the MF Segment would cause significant air quality impacts from
3 construction emissions of Criteria Pollutants because the San Joaquin Valley Air Basin
4 is in non-attainment for Criteria Pollutants; and

5 **WHEREAS**, the Authority has included in the MF Segment Resolution, and in
6 the Draft EIR/EIS for the Fresno-Bakersfield Segment (and anticipates so including in
7 the draft environmental documents for other Segments of the HST SJV District Portion)
8 various requirements and mitigation measures to reduce significant construction
9 emissions associated with the HST SJV District Portion (such as using the cleanest
10 construction and hauling fleet as reasonably practicable, as detailed in MF FEIR AQ-
11 MM#1 and #2); and

12 **WHEREAS**, nevertheless, Criteria Pollutant(s) emitted during HST construction
13 within the District Boundaries would still exacerbate and/or threaten the existing non-
14 attainment and maintenance status for Criteria Pollutants within the District Boundaries;
15 and

16 **WHEREAS**, during the public process leading up to the MF FEIR, the District
17 recommended in writing that the Authority enter into a Voluntary Emission Reduction
18 Agreement ("VERA") with the District as an additional mitigation measure (because of
19 the emissions offsets VERA implementation would achieve) for construction emission
20 impacts the MF FEIR concluded would occur in the MF Segment; and

21 **WHEREAS**, the MF Segment Resolution committed the Authority to entering
22 into a VERA with the District for the MF Segment as a mitigation measure to
23 accomplish net-zero MF Segment construction emissions of Criteria Pollutants
24 because of the San Joaquin Air Basin's difficult air quality challenge (*i.e.*, its non-
25 attainment status), which VERA now has been drafted for the funded Madera-to-
26 Fresno portion of the MF Segment and is near ready for execution ("Madera-to-Fresno
27 VERA"); and

28

1 **WHEREAS**, the Authority understands that any significant HST construction
2 emissions air quality impacts from Criteria Pollutants within the District Boundaries
3 could be mitigated through various measures, including emissions offsets to net zero
4 through entry into VERAs, which approach would address the District's view that any
5 net HST construction emissions of Criteria Pollutants within the District Boundaries are
6 impacts that must be fully mitigated; and

7 **WHEREAS**, the District has developed Incentive Programs around several core
8 principles, including cost-effectiveness, integrity, effective program administration,
9 excellent customer service, the efficient use of District resources, fiscal transparency
10 and public accountability; and

11 **WHEREAS**, the District's Incentive Programs involve the District using monies
12 (such as grant funds and project-proponent-provided monies via a VERA) to fund
13 (usually on a percentage basis) the purchase and use by third parties of newer
14 equipment that emits fewer Criteria Pollutants to replace older, less-clean-burning
15 equipment (such as farm tractors), which the District administers through Individual
16 Incentive Program Funding Agreements ("IIPFAs"); and

17 **WHEREAS**, the District's IIPFAs require the user of the new equipment to use
18 the new equipment for a minimum number of hours (based on the user's historical use
19 of the replaced equipment) over a specified number of years, and require permanent
20 destruction of the replaced equipment; and

21 **WHEREAS**, the IIPFAs, because of their requirements, result in reductions of
22 Criteria Pollutants that get assigned to the project proponent providing the funding to
23 offset emissions by that project proponent ("Criteria Pollutant VERA Offsets"); and

24 **WHEREAS**, the Criteria Pollutant VERA Offsets, because of the requirements of
25 and protections in the IIPFAs, are secured and certified to the Authority by the District
26 ("Secured Criteria Pollutant VERA Offsets") upon execution of each IIPFA; and

27 **WHEREAS**, the District's Incentive Programs are regularly audited by
28 independent outside agencies including professional accountancy corporations on

1 behalf of the federal government, the California Air Resources Board ("ARB"), the
2 California Department of Finance and the California Bureau of State Audits; and

3 **WHEREAS**, the District has determined that with appropriate funding from
4 Authority, the District can source, secure and certify Criteria Pollutant VERA Offsets as
5 necessary for construction of the HST SJV District Portion.

6 **AGREEMENT**

7 **NOW THEREFORE**, the Authority and the District hereby agree as follows:

8 1. **Offset of Construction Emissions of Criteria Pollutants**

9 (i) The Authority shall fully offset all HST SJV District Portion-related HST
10 construction emissions from Criteria Pollutants by achieving surplus, quantifiable and
11 enforceable emissions reductions of Criteria Pollutants.

12 (ii) For the purpose of this MOU, "fully offset" or "net zero" means that the
13 total amount of all Criteria Pollutants emission reductions secured by the offset
14 reduction measures is equal to, or greater than, the total amount of actual Criteria
15 Pollutant HST construction emissions within the HST SJV District Portion, minus the
16 projected emissions of Criteria Pollutants that would have occurred in the locations of
17 the HST District Portion construction in the absence of HST construction as may be
18 feasible and technically calculable for specific facilities HST might replace (as individual
19 VERAs may include). "Surplus" emission reductions are reductions that are not
20 otherwise required by existing laws or regulations.

21 (iii) In order to fully offset such construction-related air emissions from the
22 HST SJV District Portion, upon each Segment in the HST SJV District Portion having
23 been approved for construction by the Authority and any applicable state or federal
24 entity, having secured funding for construction, and having approved or certified
25 associated environmental review reports and/or statements as required by applicable
26 law ("Certified Environmental Document"), the Authority and District shall enter into a
27 VERA substantially in the form of the Madera-to-Fresno VERA to cover the portion of
28 the Segment approved and funded for construction within District Boundaries prior to

1 the commencement of construction of said portion. Notwithstanding the above, nothing
2 in this MOU shall prevent the Authority from commencing any construction if, despite
3 the Authority's best efforts, timely entry into the associated VERA did not occur; in such
4 event, the Parties shall work cooperatively to accomplish entry into the VERA in time
5 for emissions offsets to occur in a timely manner to satisfy applicable law such as
6 contemporaneous offset timing requirements established by the U.S. Environmental
7 Protection Agency for general conformity.

8 2. VERA Implementation

9 (i) Upon entering into a VERA, the Authority shall provide the District with a
10 meaningful amount of Air Quality Mitigation Funds (as a deposit) as may be specified in
11 each VERA, which the District shall place in a District trust or escrow account until
12 committed in an executed and Authority-approved IIPFA. Such Funds are intended to
13 fund equipment replacement and/or retrofit to achieve Criteria Pollutant VERA Offsets
14 and to fund the District's administrative expenses to implement the VERA, as may be
15 specified in each VERA. The Authority acknowledges that the District will require
16 availability of a meaningful amount of such Funds prior to soliciting and negotiating
17 IIPFAs to accomplish Criteria Pollutant VERA Offsets on the Authority's behalf as part
18 of any individual VERA. The District acknowledges that construction of the HST SJV
19 District Portion is not fully funded, and future funding sources and availability can affect
20 how individual VERAs get funded and the provisions and terms in such VERAs. The
21 total estimated amount of Air Quality Mitigation Funds necessary for each VERA are
22 based on (a) the total tonnage of Criteria Pollutants estimated to be emitted during the
23 HST construction covered by each VERA, as estimated within a Certified
24 Environmental Document or some subsequent estimate based on more then-up-to-
25 date construction information and (b) District's cost per ton per the then-applicable rate
26 contained in District Rule 9510 as set forth in each VERA.

27 (ii) Upon receipt of a meaningful amount of such Funds as relates to an
28 individual VERA and upon the Authority's written notice to proceed from its Contract

1 Manager to the District based on relative certainty of a likely construction start date for
2 the HST construction covered by the relevant VERA, the District will commence
3 negotiating and executing (after Authority limited review and approval) and funding
4 (from the Funds in trusUescrow) IIPFAs to achieve Secured Criteria Pollutant VERA
5 Offsets on behalf of the Authority in a timely manner to satisfy applicable law or
6 general conformity regulations requiring emission reductions to be achieved
7 contemporaneous to the actual emissions to be offset. The Authority will continue to
8 fund the trusUescrow account, and District will continue to negotiate and execute
9 additional IIPFAs to create additional Secured Criteria Pollutant VERA Offsets until
10 sufficient Secured Criteria Pollutant VERA Offsets have been funded to accomplish full
11 offset to net zero for that VERA.

12 (iii) Upon execution of each IIPFA, District shall issue to the Authority a Secured
13 Criteria Pollutant VERA Offsets Receipt, by which the District ensures to the Authority
14 that such associated offsets listed in the Receipt have been secured with no further
15 involvement or funding by the Authority.

16 (iv) Through periodic reporting to each other, the Authority will monitor the actual
17 emissions resulting from construction and the District will monitor and match such
18 actual emissions to the total offsets stated in Secured Criteria Pollutant VERA Offsets
19 Receipts issued to date. The District shall certify in writing to the Authority when the
20 total Secured Criteria Pollutant VERA Offsets listed in all Receipts issued fully offset
21 the actual construction emissions of Criteria Pollutant(s) from the HST Segment portion
22 covered by the associated VERA.

23 **3. Refunds**

24 When total offsets stated in Secured Criteria Pollutant VERA Offsets Receipts
25 equal or exceed total actual construction emissions of Criteria Pollutants for the HST
26 construction covered in a VERA, the District shall, upon Authority written request,
27 refund the Authority any remaining Air Quality Mitigation Funds which are not
28

1 encumbered through IIPFAs. The District shall have a reasonable period of time to
2 refund the unencumbered Air Quality Mitigation Funds.

3 **4. Transfer of Segment Excess Emission Reductions**

4 If total offsets stated in Secured Criteria Pollutant VERA Offsets Receipts
5 exceed total construction emissions of Criteria Pollutants for the HST construction
6 covered in a VERA, the Authority shall be credited with such excess emission ("VERA
7 Excess Emission Reduction" or "Excess"). Such VERA Excess Emission Reductions
8 shall be transferred to any other then-existing or future Authority-District VERA. If there
9 is no existing VERA and likely will not be a future VERA in time for the Authority to get
10 value for the Excess, the Authority may transfer the Excess to a third-party developer.

11 **5. District Rule 9510-Indirect Source Review**

12 Authority acknowledges that it is required to comply with all applicable laws that
13 may be in effect as the HST SJV District Portion is implemented, such as the District's
14 current Rule 9510 (including its requirement to submit an Air Impact Assessment
15 Application). The Authority acknowledges that it is subject to all applicable provisions
16 of District Rule 9510 that are in effect at the time of submitting an Air Impact
17 Assessment Application, but the District anticipates that Criteria Pollutant Offsets to be
18 accomplished through VERAs as contemplated by this MOU will satisfy the emissions
19 reductions requirements of current Rule 9510.

20 **6. Term of MOU**

21 This MOU shall be effective upon the date it is signed. The Parties acknowledge
22 that construction of the HST SJV District Portion could span one or more decades. The
23 Parties agree to work cooperatively together over that time period to evaluate any
24 amendments necessary to this MOU to reflect any relevant circumstances that may
25 change, including but not limited to changing state and federal law requirements
26 related to air quality, changes (positive or negative) in the Clean Air Act attainment
27 status of the San Joaquin Air Basin for Criteria Pollutants or other pollutants, changing
28 and evolving HST funding, and changing state and federal law requirements related to

1 the HST System. This MOU shall be terminated by its terms when total offsets stated in
2 Secured Criteria Pollutant VERA Offsets Receipts equal or exceed total actual
3 construction emissions of Criteria Pollutants for the HST SJV District Portion.

4 7. **Exhibits.** The Exhibits to this MOU are fully incorporated and are a part
5 of this MOU, and are:

- 6 A. District Boundaries Map
- 7 B. HST System and Segment Map

8 8. **Miscellaneous.** The Recitals set forth above are hereby incorporated into
9 the terms of this MOU. Counterpart and facsimile/computer image signatures shall be
10 treated as originals. Notices under this MOU shall be given in writing to the persons
11 and addresses listed in the then-most-current VERA. This MOU contains all
12 understandings between the Parties as to the matters covered herein and incorporates,
13 integrates and supersedes any different or other oral or written understandings
14 between the Parties as to the matters covered herein. This MOU was prepared equally
15 by both Parties.

16 IN WITNESS WHEREOF, the Authority and District have executed this MOU
17 and agree that it shall be effective as of the date first written above.

18 **AUTHORITY**

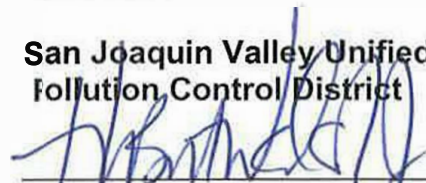
19 **High Speed Rail Authority**

20 

21 _____
22 Jeff Morales
23 Chief Executive Officer

DISTRICT

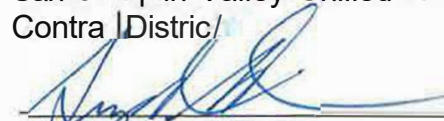
24 **San Joaquin Valley Unified Air
25 Pollution Control District**

26 

27 _____
28 Hub Walsh
Governing Board Chair

Recommended for approval:

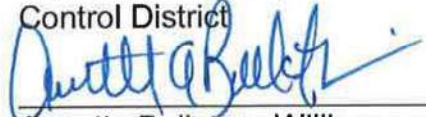
San Joaquin Valley Unified Air Pollution
Control District



Seve Cadredin
Executive Director/APCO

Approved as to legal form:

San Joaquin Valley Unified Air Pollution
Control District



Annette Ballatore-Williamson
~~Interim~~ District Counsel

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EXHIBIT A: District Boundaries/San Joaquin Valley Air Basin

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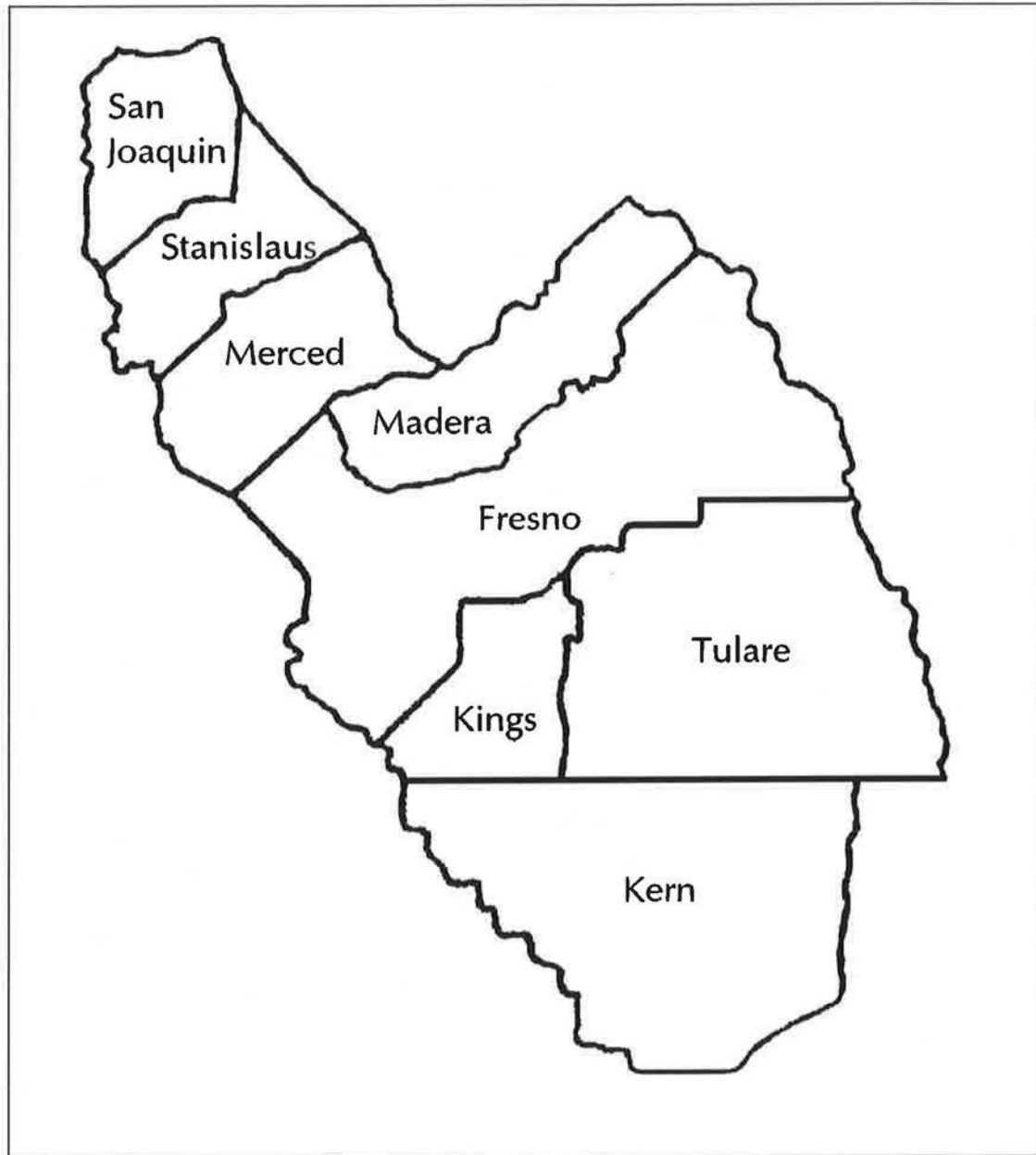


EXHIBIT B: Segments/Corridors of the HST System

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San Joaquin Valley Unified Air Pollution Control District
Meeting of the Governing Board
June 19, 2014

**APPROVE MEMORANDUM OF UNDERSTANDING AND VOLUNTARY
EMISSION REDUCTION AGREEMENT WITH THE CALIFORNIA HIGH-SPEED
RAIL AUTHORITY FOR THE PURPOSE OF MITIGATING AIR QUALITY
IMPACTS**

Attachment B:

Voluntary Emission Reduction Agreement
No. 20140105
(56 pages)

STANDARD AGREEMENT

STD. 213 (NEW 06/03)

AGREEMENT NUMBER HSR14-12
REGISTRATION NUMBER

1. This Agreement is entered into between the State Agency and the Contractor named below

STATE AGENCY'S NAME	California High-Speed Rail Authority
CONTRACTOR'S NAME	San Joaquin Valley Unified Air Pollution Control District
2. The term of this Agreement is: June 1, 2014 (or upon DGS approval, whichever is later) through July 31, 2028.
3. The maximum amount of this Agreement is: \$1,705,472 ("Agreement Funding Maximum").
One Million, Seven Hundred and Five Thousand, Four Hundred and Seventy-Two Dollars
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:

Exhibit A - Scope of Work and its Attachments A-1 to A-8 (Attachment A-4 includes a budget)	39	Pages
Exhibit B - Budget Detail and Payment Provisions	1	Page
Exhibit C - General Terms and Conditions	4	Pages
Exhibit D - Special Terms and Conditions	3	Pages
Exhibit E - Supplemental Terms and Conditions for Contracts Using Federal Funds	7	Pages

IN WITNESS WHEREOF, this Agreement has been executed by parties hereto (additional signatures on following page 9.)

CONTRACTOR		<i>California Department of General Services Use Only</i>
CONTRACTOR'S NAME (If other than an individual, state whether a corporation, partnership, etc.)		
San Joaquin Valley Unified Air Pollution Control District		
BY (Authorized Signature)	DATE SIGNED (Do not type)	
	6/20/14	
PRINTED NAME AND TITLE OF PERSON SIGNING		
Hub Walsh, Governing Board Chair		
ADDRESS		
1990 E. Gettysburg Avenue, Fresno, CA 93726		
STATE OF CALIFORNIA		
AGENCY NAME		
California High-Speed Rail Authority		
BY (Authorized Signature)	DATE SIGNED (Do not type)	
	5-29-14	
PRINTED NAME AND TITLE OF PERSON SIGNING		
Jeff Morales, Chief Executive Officer		
ADDRESS		
770 L Street, Suite 800, Sacramento, CA 95814		
		D Exempt per:

ADDITIONAL SIGNATURE PAGE FOR VERA BETWEEN CALIFORNIA HIGH-SPEED RAIL
AUTHORITY AND SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT FOR
CONSTRUCTION PACKAGE 1A/1B (MADERA TO FRESNO)

June 2014

HSRA AGREEMENT NUMBER: HSR14-12
DISTRICT AGREEMENT NUMBER: 20140105

The following authorized representatives of the District, by their signatures, recommend and approve this Agreement for execution by the District's Governing Board. **Recommended for approval:**

San Joaquin Valley Unified Air Pollution
Control District



Seyed Sadredin
Executive Director/APCO

Date: JUN 16 2014

Approved as to legal form:

San Joaquin Valley Unified Air Pollution
Control District



Annette Ballatore-Williamson
District Counsel

Date: JUN 16 2014

Approved as to accounting form:

San Joaquin Valley Unified Air
Pollution Control District



Mehri Barati
Director of Administrative Services

Date: JUN 16 2014

EXHIBIT A
SCOPE OF WORK

VOLUNTARY EMISSION REDUCTION AGREEMENT (District No. 20140105)
FOR THE MADERA-FRESNO PORTION OF THE MERCED-FRESNO HIGH SPEED
RAIL SEGMENT

This Voluntary Emission Reduction Agreement ("Agreement" or "VERA") is entered into between the CALIFORNIA HIGH-SPEED RAIL AUTHORITY ("Authority") and the SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT ("District" or "Contractor"). Authority and District are each a "Party" and collectively are the "Parties". As used herein, "Agreement" or "VERA" includes the Standard Agreement cover page (STD 213), this Exhibit A (Scope of Work) and Exhibits B to E inclusive.

RECITALS

WHEREAS, District is an air pollution control district formed by the counties of Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus and Tulare, and the Valley portion of Kern, pursuant to California Health and Safety Code section 40150, et seq.; and

WHEREAS, District is responsible for developing and implementing air quality control measures within the District Boundaries as depicted in Attachment A-1 ("District Boundaries") attached hereto and incorporated herein, including air quality control measures for stationary sources, transportation sources, and indirect sources; and

WHEREAS, the Authority, in partnership with the Federal Railroad Administration ("FRA"), is developing an electrified high-speed train ("HST") system ("System"), which includes construction of guide-way segments, and ancillary facilities such as maintenance facilities, electrical overhead catenary, stations, and overpasses for California pursuant to the California High-Speed Rail Act (Public Utilities Code section 18500 et seq.) ("Rail Act") and the Safe, Reliable High-Speed Passenger Train Bond

EXHIBIT A
SCOPE OF WORK

Act for the 21st Century (codified at Streets and Highways Code section 2704 *et seq.*) ("Bond Act") that would serve the San Francisco Bay Area, Sacramento, Central Valley, Los Angeles and San Diego (as depicted in Attachment A-2); and

WHEREAS, the System includes segments (or portions thereof) that will be constructed within the San Joaquin Valley ("SJV") District Boundaries including the following: Merced to San Jose, Merced to Fresno, Fresno to Bakersfield, Bakersfield to Palmdale, and Sacramento to Merced collectively referred to as "HST SJV District Portion"; and

WHEREAS, in 2014 the Parties anticipate entering into a Memorandum of Understanding to establish the process to fully mitigate (by offsetting to net zero) emissions from construction of the HST SJV District Portion; and

WHEREAS, the Authority completed Program-level Environmental Impact Statements/Reports (EIS/EIR) in 2005, 2008, 2010 and 2012 pursuant to the National Environmental Policy Act ("NEPA") and California Environmental Quality Act ("CEQA") evaluating impacts of the System, and selecting preferred route corridors; and

WHEREAS, a project level Final EIS/EIR ("MF FEIR") for the Merced to Fresno Segment ("MF Segment") was certified via Resolution 12-19 ("MF FEIR Resolution") and the MF Segment was approved and CEQA findings made via Resolution 12-20 ("MF Segment Resolution") by the Authority's Board of Directors in May 2012 and FRA's associated Record of Decision ("ROD") issued in September 2012; and

WHEREAS, during the public process leading up to the MF FEIR, the District recommended in writing that the Authority enter this VERA with the District as a mitigation measure for construction emissions (because of the offsets it would achieve); and

EXHIBIT A
SCOPE OF WORK

WHEREAS, construction of a portion of the MF Segment (grade separations, track bed and track bed structures from approximately Madera to downtown Fresno; rails, electrification and stations will be part of a future construction package(s)) is anticipated to commence in 2014 (known as Construction Package 1A/1 B or "CP 1A/1 B"), and the Authority has not secured funding to construct north of Madera; and

WHEREAS, despite incorporation of various requirements and mitigation measures (i.e., using the cleanest construction and hauling fleet as reasonably practicable, as detailed in MF FEIR AQ-MM#1 and #2) to reduce the construction emissions associated with the MF Segment, the Authority concluded in its MF Segment Resolution that construction would nevertheless still cause significant cumulative impacts on air quality within the District Boundaries because of the existing nonattainment status or maintenance status for Criteria Pollutants (extreme nonattainment, in the case of ozone precursors Oxides of Nitrogen ("NOx") and Volatile Organic Compounds ("VOCs")); and

WHEREAS, the Authority in the MF Segment Resolution committed to fully mitigate) cumulative air quality impacts of the MF Segment resulting from construction for VOC, NOx, Particulate Matter of 10 microns or less in size ("PM10") and Particulate Matter of 2.5 microns or less in size ("PM2.5") (the "Offset Obligation"), collectively referred to as "Criteria Pollutants", by offsetting Criteria Pollutants collectively in the aggregate to net zero; and

WHEREAS, the Authority determined the Offset Obligation was feasible because of the District's representations to the Authority about its expertise and its ability to partner with the Authority to implement the Offset Obligation at the Offset Cost Schedule set forth in Table 1; and

EXHIBIT A
SCOPE OF WORK

WHEREAS, the Authority in the MF Segment Resolution committed to causing the emissions offsets to occur within one year of the associated emission to be offset, or longer as permitted by 40 Code of Federal Regulations Part 93 Section 93.163 ("Offset Timing Requirement"); and

WHEREAS, the District has developed Incentive Programs around several core principles, including cost-effectiveness, integrity, effective program administration, excellent customer service, the efficient use of District resources, fiscal transparency and public accountability; and

WHEREAS, the District's Incentive Programs involve the District using monies (such as project-proponent-provided monies) to fund (usually on a percentage basis) the purchase and use by third parties of newer equipment that emits fewer Criteria Pollutants to replace older, less-clean-burning equipment (such as farm tractors), which the District administers through Individual Incentive Program Funding Agreements; and

WHEREAS, the District's Individual Incentive Program Funding Agreements require the user of the new equipment to use the new equipment for a minimum number of hours (based on the user's historical use of the replaced equipment) over a specified number of years, with penalties and remedies for failure to so use the equipment including potentially having to return the funds for redeployment, and require permanent destruction of the replaced equipment; and

WHEREAS, the Individual Incentive Program Funding Agreements, because of their requirements, result in reductions of Criteria Pollutants that get assigned to the project proponent providing the funding (the Authority, in this case) to offset emissions by that project proponent ("Criteria Pollutant VERA Offsets"); and

EXHIBIT A
SCOPE OF WORK

WHEREAS, the Criteria Pollutant VERA Offsets, because of the requirements of and protections in the Individual Incentive Program Funding Agreements, are generated and become secured upon execution of each Individual Incentive Program Funding Agreement; and

WHEREAS, the District's Incentive Programs are regularly audited by independent outside agencies including professional accountancy corporations on behalf of the federal government, the California Air Resources Board (ARB), the California Department of Finance and the California Bureau of State Audits ("Successful Audit History"); and

WHEREAS, the District has determined that with appropriate funding from Authority, the District can generate and certify Criteria Pollutant VERA Offsets to fully offset the CP 1A/1 B portion of the MF Segment ("CP 1A/1 B Portion") construction emissions of Criteria Pollutants; and

WHEREAS, District has a history of successfully implementing at least eleven agreements similar to this VERA at an average cost-effectiveness per ton of \$7,911, and has never to date needed to request a project proponent in any of those VERAs or any other VERA to provide funds beyond the original total funds estimate (including administrative fee) and deposit.

AGREEMENT

1. Offset of Emissions of Criteria Pollutants during Construction for CP 1A/1 B Portion and Cost Estimate

i For CP 1A/1 B, the Authority shall fully offset its actual construction emissions of Criteria Pollutants, which offsets the District shall provide and guarantee through the Authority's funding of and the District execution and implementation of

EXHIBIT A
SCOPE OF WORK

Individual Incentive Program Funding Agreements ("IIPFA") that achieve surplus, quantifiable and enforceable emissions reductions.

ii. For the purpose of this Agreement, "fully offset" or "net zero" means that the aggregate sum of all Criteria Pollutants emission reductions achieved by the IIPFAs is equal to, or greater than, the aggregate sum of actual Criteria Pollutant emissions from construction of the CP 1A/1 B Portion, meaning excess offset of one Criteria Pollutant is credited against emissions of other Criteria Pollutants. "Surplus" emission reductions are reductions that are not otherwise required by existing laws or regulations.

iii. CP 1A/1 B extends approximately from the intersection of Avenue 17 and the Burlington Northern Santa Fe ("BNSF") rail line in Madera to the intersection of Santa Clara Street and the Union Pacific rail line in downtown Fresno, as shown in Attachment A-3. Estimated construction emissions of Criteria Pollutants, by year by pollutant, for CP 1A/1 B are set forth in Attachment A-4 ("CP 1A/1 B Criteria Pollutants Estimate"), which reflect implementation of AQ-MM#1 and #2 (contractor's use of a cleaner fleet). Based on the District's current estimated cost-per-ton, plus the District's four percent (4%) administrative cost overhead ("District Overhead") to procure offsets and to implement this Agreement, as specified in Section 2.1, and the CP 1A/1 B Criteria Pollutants Estimate, achieving Criteria Pollutant VERA Offsets for CP 1A/1 B to net zero will cost approximately \$1,364,377 ("CP 1A/1 B Offset Cost Estimate"), as also shown in Attachment A-4. This is only an estimate; the actual cost to fully offset CP 1A/1 B may be higher or lower depending upon a number of factors which cannot be precisely determined now, including but not limited to the evolving market price to accomplish offsets and the actual pace and sequencing of construction. Accordingly, the Authority agrees to provide funds up to \$1,705,472 ("Agreement Funding Maximum") (which is

EXHIBIT A
SCOPE OF WORK

the above amount plus twenty-five percent (25%); any additional amount would require an amendment to this VERA) to fully offset its actual CP 1A/1 B construction emissions of Criteria Pollutants, subject to the District's obligations to secure those offsets on the Authority's behalf in a cost-effective manner as required by Paragraph 2.1.

iv. The Authority at any time may submit to the District a Revised CP 1A/1 B Criteria Pollutants Estimate to reflect then-current information about construction timing, sequencing and equipment. The Authority and District shall work closely after submission to review and revise as necessary to allow District approval in writing within 30 days of submission; the CP 1A/1 B Offset Cost Estimate shall be adjusted accordingly, upon such approval, via Operating Memorandum pursuant to Paragraph 16.ii.

2. Emissions Offsets Funding

2.1 Offset Cost Per Ton

Offset cost estimates under this VERA are based on the District's cost per ton set forth below in Table 1 (Offset Cost Schedule).

Table 1 Offset Cost Schedule

Criteria Pollutants	Cost \$/ton
NOx or VOC/ROG	\$9,350
PM10 (which includes PM2.5)	\$9,011

These per-ton costs are not a guarantee and only an estimate, but the District shall use every reasonable effort to accomplish average per-ton costs, calculated as of its execution of the last IIPFA under this VERA, no higher than these Table 1 costs, as Table 1 might be modified per this Paragraph 2.1. The Table 1 per-ton costs derive from District Rule 9510 (Indirect Source Review) and are subject to change through the

EXHIBIT A
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District's formal public procedures for amending these rules. Consistent with District Rule 3180 (Administrative Fees for Indirect Source Review), the total offset cost estimates shall include (which is included in Attachment A-4) an administrative cost equal to four percent (4%) of the offset cost estimate. Any changes to District Rule 3180 or 9510 will be conducted through the District's formal public procedures and process for amending these rules.

District shall provide written notice (via email and mail) to the Authority of any pending Rule 3180/9510 cost per ton change at least fifteen (15) days prior to any District approval of or decision on such pending change. The results of that change shall be memorialized via Operating Memorandum pursuant to Paragraph 16.ii.

2.2 Air Quality Cost per Ton

Revisions to the CP 1A/1B Offset Cost Estimate (as contemplated in Paragraphs 1 and 3.2) shall be based on Table 1 or the average cost-effectiveness the District then projects it will accomplish for this VERA (based on the IIPFAs then executed to date under this VERA), if the District concludes after consulting with the Authority that the projected cost-effectiveness will be different than Table 1 (as Table 1 might be modified per Paragraph 2.1).

2.3 Payment of Funds for Criteria Pollutant VERA Offsets

i. Within fifteen (15) days after this VERA has been entered into by the Authority and the District, and then approved by the California Department of General Services ("DGS"), the District shall send to the Authority an Initial Invoice in the form of Attachment A-5, or in another form as the Authority may reasonably request.

ii. Within one hundred twenty (120) days after the Authority receives the Initial Invoice from the District or DGS has approved this VERA, whichever is later, the

EXHIBIT A
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Authority shall deposit with the District initial funds in the amount of five-hundred thousand dollars (\$500,000) ("Initial Deposit"), or a greater amount if the parties so agree via Operating Memorandum pursuant to Paragraph 16.ii, as initial funding towards the CP 1A/1 B Offset Cost Estimate. This initial deposit and each subsequent deposit are collectively referred to herein as "Deposits" with each being a "Deposit".

iii. The District will place each Deposit into a District-held but segregated High Speed Rail Offset Funding Trust Account. Deposits will be used to fund Individual Incentive Program Funding Agreements. Deposits in the High Speed Rail Offset Funding Trust Account are held by the District in trust for the Authority and are the property of the Authority until moved to the District's Committed High Speed Rail Offsets Funds Account under Paragraph 2.4. This High Speed Rail Offset Funding Trust Account shall serve all Authority VERAs as the Authority replenishes it in accordance with Paragraph 2.4.

2.4 Individual Incentive Program Funding Agreements; Secured Criteria Pollutant VERA Offsets Receipt; Trust Account Replenishment

i. Upon the Authority's submission to District of the Initial Deposit (and upon the Authority's written notice to proceed from its Contract Manager to the District based on relative certainty of a likely construction start date) and upon each Authority additional Deposit, the District is obligated to use Deposits to enter into IIPFAs to achieve Criteria Pollutant VERA Offsets for construction of the CP 1A/1 B Portion on behalf of the Authority to the extent required under this Agreement. District shall use diligent efforts to negotiate and prepare draft Individual Incentive Program Funding Agreements with the owners and/or operators of the pollution source equipment ("IIPFA Equipment User") within District Boundaries, as identified by the District's Incentive

EXHIBIT A
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Programs (such Agreements may not involve retrofit of existing equipment or facilities). District shall use reasonable efforts, balanced with other requirements of this VERA, to prioritize owners and/or operators of pollution source equipment that will lead to generation of Criteria Pollutant VERA Offsets located as close as possible geographically to the location of the CP 1A/1 B construction.

ii. IIPFAs shall include the following: (a) the business address of the IIPFA Equipment User; (b) the Tax Identification Number of the IIPFA Equipment User; (c) the location(s) where the funded equipment is anticipated to be used; (d) replaced equipment disposal requirement; (e) description of replaced and new equipment; (f) minimum annual usage requirement for new equipment; and (g) the Authority named as an intended third-party beneficiary if the Authority so requests and the District so agrees. The Parties may adjust the preceding IIPFA content requirements via Operating Memorandum (pursuant to Paragraph 16.ii) if necessary to improve VERA implementation, provided such adjustments will allow the Authority to meet its auditing and reporting requirements.

iii. The District shall provide each negotiated draft IIPFA to the Authority via e-mail prior to District execution, together with a draft Criteria Pollutant VERA Offsets Receipt (defined in Paragraph 2.4.v. below) specifying clearly the amount of Criteria Pollutant VERA Offsets, by pollutant by year, the IIPFA will provide, how much such Criteria Pollutant VERA Offsets will cost out of the Deposit funds (including District Overhead), and the per-ton-by-pollutant cost, for review by the Authority within five (5) business days. Authority's review is limited to ensuring each IIPFA and associated draft Criteria Pollutant VERA Offsets Receipt (a) identifies the quantity of Criteria Pollutant reductions of which type are generated by the IIPFA in each year and associated costs

EXHIBIT A
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(so the Authority knows exactly what it is paying for at what cost) and (b) meets the requirements in Paragraph 2.4 (sub-sections i and iii) of this VERA for what IIPFAs and Criteria Pollutant VERA Offsets Receipts must contain.

iv. Upon full execution of an Authority-approved IIPFA, District may move funds equal to that shown in the associated draft Criteria Pollutant VERA Offset Receipt, including District Overhead which is to compensate the District for its staff time and other administrative costs to implement the IIPFA on behalf of the Authority. The Authority acknowledges that District has provided historical and auditable documentation to the Authority demonstrating that 4% is a reasonable approximation of the District's costs to implement agreements such as this VERA and IIPFAs; District agrees to provide any further of such documentation during the term of this VERA if the Authority reasonably concludes that such further documentation is necessary to satisfy any future audits or the FRA.

v. Within ten (10) days after full execution of each Authority-approved IIPFA, District shall provide a copy of that IIPFA and a Criteria Pollutant VERA Offsets Receipt (in the form of Attachment A-6, or in another form as the Authority may reasonably request) to the Authority specifying the amount of Criteria Pollutant VERA Offsets, by pollutant by year, secured by the IIPFA ("Secured Criteria Pollutant VERA Offsets"), how much such Criteria Pollutant VERA Offsets cost out of the Deposit funds (including the District Overhead), and the per-ton-by-pollutant cost. Thereafter, the District is obligated to implement each IIPFA and to ensure, at no further cost to and no further involvement by the Authority, that associated Secured Criteria Pollutants VERA Offsets are generated as set forth in the associated Criteria Pollutant VERA Offsets Receipt; should such generation fail as to any IIPFA and associated Criteria Pollutant VERA

EXHIBIT A
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Offsets Receipt, the District shall take whatever steps are required (including but not limited to entering into additional IIPFAs, and funding them at no cost to the Authority) to ensure that substitute emissions reductions occur equivalent in amount to the associated Criteria Pollutant VERA Offsets Receipt, and in a timing manner that allows the Offset Timing Requirement to be met for actual Criteria Pollutant Emissions from CP 1A/1 B construction.

vi. The District shall keep detailed records of the generation of Secured Criteria Pollutants VERA Offsets over the life of the performances required under the associated IIPFA, consistent with District's record-keeping practices that have led to its Successful Audit History; District shall make such records available to the Authority and/or FRA for review upon request and shall keep such records for fifteen (15) years.

vii. Upon receiving any Criteria Pollutant VERA Offsets Receipt, the Authority shall have no more than sixty (60) days to replenish the High Speed Rail Offset Funding Trust Account in the amount of that Receipt until total Deposits equal the CP 1A/1 B Offset Cost Estimate as it may by then have been adjusted pursuant to Paragraphs 1(iv) or 3.2(i). The District acknowledges that this sixty-day requirement is dependent upon the Authority receiving the required replenishment amount from FRA as reimbursement to the Authority of the Criteria Pollutant VERA Offsets Receipt amount. This subsection is not a limit on the Authority's obligations set forth in Paragraph 1.

viii. The District shall use every reasonable effort initially to match the Secured Criteria Pollutant VERA Offsets to the by-pollutant-by-year CP 1A/1 B Criteria Pollutants Estimate listed in Attachment AA (as it may get revised per Paragraph 1(iv)) to satisfy the Offset Timing Requirement on a 1:1 basis (not the higher offset ratios permitted by the Offset Timing Requirement), and shall adjust those efforts over time as reasonably

EXHIBIT A
SCOPE OF WORK

possible (including by delaying execution of further IIPFAs if Criteria Pollutant VERA Offsets production get too far ahead temporally of actual emissions) to reflect actual emissions of Criteria Pollutants, as reported in accordance with Paragraph 3.2. The District shall advise the Authority in writing, as soon as the District recognizes and before executing any additional IIPFAs, if it reasonably determines that the 1:1 standard cannot be met, in which case the Parties shall meet and confer to develop an implementation strategy to ensure the timing and amounts of emissions reductions occur at a minimum as specified by the Offset Timing Requirement.

3. Segment Related Construction Emissions

3.1 Actual Construction Emissions Assessment

i. Commencing at first to occur of excavation, grading, demolition, construction-vehicle travel on paved or unpaved surfaces creating vehicle exhaust, any of which occurs for the sole purpose of constructing (but not designing) the CP 1A/1 B Portion ("Construction"), the Authority shall start collecting detailed daily Construction information to determine the actual Criteria Pollutant Construction emissions for the CP 1A/1 B Portion. To determine the actual Criteria Pollutant Construction emissions for that Portion (for inclusion in the Construction Report required by Section 3.1.iii), the Authority shall use the California Emissions Estimator Model (CalEEMod), or any substitute computer model or analysis approved by the District (such as a spreadsheet containing hand calculations using the most current emission factors for quantifying actual construction emissions). The District and Authority shall agree in writing upon, via Operating Memorandum pursuant to Paragraph 16.ii, the date Construction started so as to fix subsequent reporting deadlines.

EXHIBIT A
SCOPE OF WORK

ii. Construction information shall include emission sources associated with the on-site and off-site construction activities. For on-site construction activities, the Authority shall collect data for all off-road equipment by equipment type, engine horsepower, engine model year, and total daily hours of operation for each construction activity (i.e., site preparation, grading, paving, demolition, etc.). For off-site construction activities, the Authority shall collect all vehicle trips by general category of activity (employee and vendor travel or materials delivery), by vehicle type (i.e., auto, light-duty truck, heavy duty truck) and their associated total vehicle miles. The on-site and off-site construction activities will be monitored by the Authority, as presented in Attachment A-Z ("Construction Reporting Detail Information"). Records of the construction information shall be kept by the Authority for fifteen (15) years and made available to the District upon request.

iii. The Authority shall submit to the District a Construction Report within sixty (60) days starting at the end of every three (3) month period (or other frequency, as the Parties may agree in writing via Operating Memorandum pursuant to Paragraph 16.ii) following the start of Construction, and within sixty (60) days of any termination pursuant to Section SA.ii. The Construction Report, as outlined in Attachment A-8, shall be based on the Construction Reporting Detail Information collected during every three (3) month period and any other information or data as the Parties may agree to via Operating Memorandum pursuant to Paragraph 16.ii. The District shall evaluate the Construction Report and provide its review in the Emission Reduction Status Report in accordance with Paragraph 3.2. Upon completion of the entire CP 1A/1 B Construction activities that generate material amounts of Criteria Pollutants, but no later than sixty (60) days after the Authority's issuance to its CP 1A/1 B contractor of Certificate of Final Acceptance,

EXHIBIT A
SCOPE OF WORK

the Authority shall submit to the District a Final Construction Report summarizing all actual Construction related Criteria Pollutant emissions for CP 1A/1 B.

3.2 Emission Reduction Status Reporting

i. Upon the District's receipt of the Construction Report, the District shall have sixty (60) days to prepare and submit to the Authority an Emission Reduction Status Report ("Status Report"). This Status Report shall compare the Secured Criteria Pollutant VERA Offsets to date to the emissions of Criteria Pollutants in the CP 1A/1 B Construction Reports to date. The Status Report also shall identify the average cost-effectiveness (in dollars per Criteria Pollutant per ton) based on the IIPFAs then executed to date under this VERA. Based on the foregoing in this Paragraph 3.2.i, the Status Report shall identify whether the then-current CP 1N1 B Offset Cost Estimate is accurate and if not accurate shall propose a re-adjustment as necessary for the Authority's review and consideration for approval within thirty (30) days. The Status Report also shall provide an accounting of (a) the High Speed Rail Offset Funding Trust Account, (b) the Committed High Speed Rail Offsets Funds Account (listing the IIPFA associated with each funds commitment entry) and (c) funds actually paid out from the Committed High Speed Rail Offsets Funds Account (listing the IIPFA associated with each pay out and the associated Secured Criteria Pollutant Offset amount). The District agrees to meet telephonically or in person with the Authority if the Authority has any questions related to any Status Report.

ii. When the total Secured Criteria Pollutant VERA Offsets equal or exceed the total emissions of Criteria Pollutants reported in Construction Reports through the Final Construction Report for CP 1A/1 B, the District shall issue a Final Status Report so verifying. Excess offsets achieved shall be handled pursuant to Paragraph 3.4. Any

EXHIBIT A
SCOPE OF WORK

funds then remaining in the High Speed Rail Offset Funding Trust Account associated with CP 1A/1 B shall be returned to the Authority by the District within thirty (30) days of issuing the Final Status Report, unless otherwise agreed to in writing by the Authority.

3.3. MF Segment Construction Phases after CP 1A/1 B

Construction within the MF Segment beyond CP 1A/1 B will be handled via amendment to this VERA or via a separate VERA, as the Parties subsequently may agree in such amendment or separate VERA.

3.4. Disposition of Excess Secured Criteria Pollutants VERA Offsets

i. If total Secured Criteria Pollutant VERA Offsets exceed the total actual emissions of Criteria Pollutants reported in Construction Reports through the Final Construction Report for CP 1A/1 B ("CP 1A/1 B Excess Secured VERA Offsets"), as reported in the Final Status Report, such CP 1A/1 B Excess Secured VERA Offsets can be transferred to any other Authority construction within District Boundaries; use of such transfers must comply with the Offset Timing Requirement. Such transfer shall be deemed effective fifteen (15) days after Authority written notification to the District of such transfer. If other Authority construction is not available to receive the benefit of such a transfer, the Authority may transfer the CP 1A/1 B Excess Secured VERA Offsets to a third-party development project in the District Boundaries unless then-applicable law prohibits such a transfer.

ii. If CP 1A/1 B construction gets de-funded, halted or suspended for whatever reason for a predicted material amount of time, and if total Secured Criteria Pollutant VERA Offsets exceed the total emissions of Criteria Pollutants for CP 1A/1 B construction up to the construction halt or de-fund date, the District shall not enter any further IIPFAs for CP 1A/1B and the Authority may transfer the excess Secured Criteria

EXHIBIT A
SCOPE OF WORK

Pollutant VERA Offsets to other Authority construction or to a third-party development project(s) in the District Boundaries. In addition, District shall apply any funds then in the High Speed Rail Offset Funding Trust Account for CP 1A/1 B to any then-active other Authority-District VERA(s); if there are none, then the District shall return to the Authority (if the Authority so requests) any such funds. Prior to re-starting CP 1A/1 B construction, the Authority shall deposit with the District funds equivalent to the transferred Secured Criteria Pollutant VERA Offsets plus any amount returned to the Authority (or applied to non-CP 1A/1 B Authority construction) out of the High Speed Rail Offset Funding Trust Account pursuant to the preceding sentence.

4. District Rule 9510 (Indirect Source Review) Requirement

Authority acknowledges that it is required to comply with Rule 9510. The Authority has submitted, and the District has approved, an Air Impact Assessment ("AIA") Application, consistent with District Rule 9510 (Indirect Source Review) requirements. The Authority acknowledges that it is subject to all applicable provisions of District Rule 9510 that are in effect at the time of submitting an Air Impact Assessment Application.

5. Subsequent Litigation, Legislation and/or Administrative Action / Credit to the Authority

In the event that despite this Agreement, Authority is required as a result of a final judgment or District Approved Settlement (as defined below) in any third-party litigation, to pay monies in addition to the monies to be paid by Authority pursuant to this VERA, then District shall acknowledge and credit Authority with any additional emission reduction achieved to offset MF Segment construction emissions that will result from Authority's payment of such additional monies. For purposes of this Paragraph, a

EXHIBIT A
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"District Approved Settlement" shall mean a settlement of a lawsuit filed pursuant to CEQA, NEPA or other applicable environmental law which (i) provides for Authority's payment of monies in exchange for a dismissal of such lawsuit, (ii) provides for the use of such monies by the petitioner in such lawsuit in such a manner as to mitigate adverse air quality impacts of the MF Segment, and (iii) is approved in writing by District. The District shall have no authority to commit the Authority's money in any settlement of a third-party lawsuit without the Authority's consent, and the District shall have no authority over the Authority's ability or decision to settle or terms of settlement; the District's role is limited to evaluating any settlement for credit-giving purposes as stated above.

5A. Term of Agreement

i. This Agreement shall be effective upon the date fully executed and approved by the California Department of General Services, and shall terminate automatically upon the first to occur of (1) July 31, 2028, or (2) generation of all emissions reductions secured by the Secured Criteria Pollutant VERA Offsets required under this VERA, at which time the District shall so inform the Authority in writing.

ii. At any time prior to the events listed in Paragraph 5A.i, for any reason notwithstanding anything to the contrary in this VERA, but only after the Parties complete dispute resolution under Paragraph 6, either Party may by written notice to the other Party ("Termination Notice") terminate this Agreement; termination shall be effective upon the date the receiving party receives the Termination Notice and shall release the Parties from all VERA obligations to each other except as provided below and elsewhere in this Agreement. District shall refund to the Authority any funds in the High Speed Rail Offset Funding Trust Account associated with CP 1A1 B construction

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a of the date the District receives (or sends) the Termination Notice. Notwithstanding termination by Termination Notice by either Party or because the VERA end date of July 31, 2028, has been reached, District's obligations to oversee implementation of IIPFAs, to ensure that Secured Criteria Pollutants VERA Offsets are generated as set forth in Criteria Pollutant VERA Offsets Receipts, and to keep detailed records of the generation of Secured Criteria Pollutants VERA Offsets over the life of the IIPFAs, as required by Paragraph 2.4, shall remain effective for as long as necessary to ensure generation of all emissions reductions secured by the Secured Criteria Pollutant VERA Offsets regardless of termination by any means. In the event the Authority terminates this Agreement (unless the Authority terminates because the District materially breaches this Agreement or because funding for the construction of the CP 1A/1 B Portion is deleted or cancelled), or in the event the District terminates this Agreement because the Agreement Funding Maximum is not increased via VERA amendment despite the Parties' agreement that additional funding is necessary to satisfy the emissions-offset purposes of this VERA, the Authority shall consult with the District as the Authority develops a feasible alternative strategy to comply with the remainder of its Offset Obligation, which alternative strategy the Authority shall use best efforts to develop within ninety (90) days of such termination and regarding which the Authority thereafter shall obtain District's approval (which approval shall not be unreasonably withheld), which consultation and approval requirement shall survive such termination.

6. Dispute Resolution

In the event a dispute arises between the Parties about any provision in this Agreement or the implementation of this Agreement that cannot be resolved through

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discussions between the Parties or their authorized representatives, the following steps shall be taken.

i. The Executive Officer of the Party alleging a dispute shall send a letter to the other Party's Executive Officer outlining the dispute and the action desired. The receiving Party shall respond in writing within twenty-one (21) days. Should either Party request, the Executive Officers shall meet by telephone or in person.

ii. If despite Executive Officer communications the Parties cannot resolve the dispute, the Parties shall mediate the dispute in good faith if one Party so requests in writing. Mediation shall be conducted by JAMS mediation services (or a substitute, if the Parties mutually agree) in Sacramento by a mediator mutually selected by the Parties. The Parties shall use their best efforts to schedule the mediation to take place no later than two (2) months after the date mediation is requested, subject to mediator availability. The Parties shall share equally the costs of mediation as invoiced by JAMS or substitute (unless the Parties agree otherwise on a case-by-case basis), but shall bear their own attorney's fees.

iii. If mediation does not resolve the dispute, either Party may commence litigation in a court of competent jurisdiction, subject to the provisions of Paragraph 19.

iv. Should the dispute be of an urgent nature, the aggrieved Party may commence litigation without first completing mediation. In such case, the Parties shall mediate and litigate concurrently, with mediation occurring pursuant to Paragraph 6.ii.

v. The Parties shall continue to perform their obligations under this VERA during the dispute resolution process, unless the dispute at issue would prejudice one Party if that Party continued to perform a particular obligation; in such case, the Parties shall attempt to make arrangements, including contingencies as necessary, to allow the

EXHIBIT A
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Party to continue to perform the obligation during dispute resolution to allow the Party to perform the obligation in question without risk of prejudice.

7. Representations, Covenants and Warranties

7.1. The Authority's Representations, Covenants and Warranties.

The Authority represents, covenants and warrants to District, as of the date of this Agreement, as follows:

i. The undersigned representative(s) of the Authority are duly authorized to execute, deliver and perform this Agreement, and upon the Authority's execution and delivery of this Agreement, this Agreement will have been duly authorized by the Authority.

ii. Upon execution and delivery of this Agreement by the Authority, the Authority's obligations under this Agreement shall, subject to Legislative appropriation and availability of funds and review and approval by the California Department of General Services, be legal, valid and binding obligations of the Authority, duly enforceable at law and in equity in accordance with the terms and conditions of this Agreement.

iii. There is no lawsuit, legal action, arbitration, legal or administrative proceeding, legislative, quasi-legislative or administrative action or claim existing, pending, threatened or anticipated which would render all or any portion of this Agreement invalid, void or unenforceable in accordance with the terms and conditions thereof, with the exception of pending and anticipated legal proceedings that could lead to suspension or stoppage of CP 1A/1 B construction and/or its funding which would suspend or stop the Authority's ability and need to fund emissions offsets for that suspended or stopped construction.

EXHIBIT A
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iv. Other than the execution and delivery of this Agreement by the undersigned representatives of Authority, and approval by the Board of Directors of the Authority (if and as required by Authority rules and delegations) and approval by DGS, there are no approvals, consents, confirmations, proceedings, or other actions required by Authority or any third party, entity or agency in order to enter into and carry out the terms, conditions and intent of the parties with respect to this Agreement, except as provided in Paragraph 7.1.ii.

v. Upon the approval of this Agreement by the Authority, the Chief Executive Officer of the Authority, or equivalent representative, or a delegee of such officer, has the authority to approve, deliver, verify, acknowledge and/or accept any communication, notice, notification, verification, and/or other document to be issued by Authority as reasonably necessary to implement, and if consistent with, the terms and conditions of this Agreement, without further approval of the Board of Directors of the Authority. This Section 7.1.v is a statement of existing authority, and does not grant any new or expanded authority.

7.2. District's Representations, Covenants and Warranties

District represents, covenants and warrants to the Authority, as of the date of this Agreement, as follows:

i. The undersigned representatives of District are duly authorized to execute, deliver and perform this Agreement, and upon District's execution and delivery of this Agreement, this Agreement will have been duly authorized by District.

ii. Upon execution and delivery of this Agreement by District, District's obligations under this Agreement shall be legal, valid and binding obligations of District,

EXHIBIT A
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duly enforceable at law and in equity in accordance with the terms and conditions of this Agreement.

iii. There is no lawsuit, legal action, arbitration, legal or administrative proceeding, legislative, quasi-legislative or administrative action or claim existing, pending, threatened or anticipated which would render all or any portion of this Agreement invalid, void or unenforceable in accordance with the terms and conditions thereof.

iv. Other than the execution and delivery of this Agreement by the undersigned representatives of District, and approval by the Governing Board of the District, there are no approvals, consents, confirmations, proceedings, or other actions required by District or any third party, entity or agency in order to enter into and carry out the terms, conditions and intent of the parties (except DGS approval per Paragraph 7.1.iv) with respect to this Agreement, except IIPFA Equipment User approval of IIPFAs.

v. The monies paid by the Authority under this Agreement shall be sufficient to ensure that the emission reduction contemplated by this Agreement shall occur, and District shall utilize such monies in such a manner as to ensure that such emission reductions shall occur.

vi. Upon the approval of this Agreement by the governing board of District, the Air Pollution Control Officer of District, or equivalent representative, or a delegee of such officer, shall have the authority to approve, deliver, verify, acknowledge and/or accept any communication, notice, notification, verification, and/or other document to be issued by District as reasonably necessary to implement, and if consistent with, the terms and conditions of this Agreement, without further approval of the Governing Board of District.

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8. Indemnification

i The Authority agrees to indemnify, defend and hold harmless District for, from and in connection with any third party claims, losses and/or liabilities arising from or in connection with Authority's performance under this Agreement, excluding only such claims, losses and/or liabilities which result from or are in connection with District's sole negligence, act or omission.

ii The District agrees to indemnify, defend and hold harmless the Authority, and its officers, agents and employees, for, from and in connection with any third party claims, losses and/or liabilities arising from or in connection with any IIPFA or equipment funded by it or the District's failure to perform its obligations under this Agreement, excluding only such claims, losses and/or liabilities which result from or are in connection with the Authority's sole negligence, act or omission.

9. Inurement

The Authority's rights and obligations under this Agreement, or applicable portions thereof, shall inure to the benefit of and be binding upon any government agency that may succeed to the Authority's responsibilities for the HST System construction work covered by this VERA. Upon any such succession, the rights and obligations of the Authority under this Agreement shall be transferred to the transferee thereof, and the Authority shall thereupon be released by District from all obligations and liabilities so assigned, except for such obligations and liabilities arising prior to such succession.

10. Assignment and Subcontracting

i Neither Party shall have the right to assign all or any part of its rights and/or obligations under this Agreement without the other Party's written consent, which consent shall not be unreasonably withheld. In the event the other Party does give

EXHIBIT A
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consent to any such assignment, the other Party, the third party assignee and the assigning Party shall enter into an amendment and novation of this Agreement which acknowledges the assignment and conforms the various provisions of this Agreement as may be required to be conformed in order to provide to the assignee the rights and benefits of this Agreement as if such assignee and its project were the original party and project contemplated in this Agreement.

ii. Neither Party may satisfy its obligations under this Agreement via a subcontract. IIPFAs are not subcontracts.

11. Recitals Incorporated

The recitals set forth hereinabove are hereby incorporated into this Agreement and acknowledged, agreed to and adopted by the Parties to this Agreement.

12. Further Assurances

The Authority and District agree to execute and deliver any documents and/or perform any acts which are reasonably necessary in order to carry out the intent of the parties with respect to this Agreement.

13. No Joint Venture or Partnership

District and the Authority agree that nothing contained in this Agreement or in any document executed in connection with this Agreement shall be construed as making District and the Authority joint venturers or partners.

14. Notices

Any notices or communications relating to this Agreement shall be given in writing and shall be deemed sufficiently given and served for all purposes when delivered, if (a) in person, (b) by facsimile or electronic mail (with the original delivered by other means set forth in this paragraph), (c) by generally recognized overnight

EXHIBIT A
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courier or (d) by United States Mail, postage prepaid, to the respective addresses set forth below, or to such other addresses as the Parties may designate from time to time by providing written notice of the change to the other Party.

<p>THE AUTHORITY</p> <p>Mark Mcloughlin Director of Env. Services 770 L Street, Suite 800 Sacramento, CA 95814 Ph: (916) 403-6934 Fax: (916) 322-0827 E-mail: mark.mcloughlin@hsr.ca.gov</p> <p>And Contract Manager 770 L Street, Suite 800 Sacramento, CA 95814 (916) 403-6934 Fax: (916) 322-0827</p>	<p>DISTRICT</p> <p>Seyed Sadredin Executive Director/APCO 1990 E Gettysburg Avenue Fresno, CA 93726 Ph: (559) 230-6000 Fax: (559) 230-6061 E-mail: seyed.sadredin@valleyair.org</p>
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15. Entire Agreement

The terms of this Agreement, together with all attached exhibits, are intended by the parties as the complete and final expression of their agreement with respect to such terms and exhibits and may not be contradicted by evidence of any prior or contemporaneous agreement. This Agreement specifically supersedes any prior written or oral agreements between the parties with respect to the subject matter of this Agreement.

16. Amendments and Waivers

i. No addition to or modification of this Agreement shall be effective unless set forth in writing, signed by the Party against whom the addition or modification is

EXHIBIT A
SCOPE OF WORK

sought to be enforced, and approved by the District's and Authority's respective governing boards if and as required by applicable law and then-extant Executive Officer delegations of authority. The Party benefited by any condition or obligation may waive the same, but such waiver shall not be enforceable by another Party unless made in writing and signed by the waiving Party.

ii. The Parties shall use Operating Memoranda, which shall be signed by both Parties, to formalize agreement as to matters which this Agreement requires or allows use of Operating Memoranda, or as to other matters where implementation detail requires further elaboration but is consistent with this Agreement.

17. Invalidity of Provisions

If any provision of this Agreement as applied to either Party or to any circumstance shall be adjudged by a court of competent jurisdiction to be void or unenforceable for any reason, the same shall in no way affect (to the maximum extent permissible by law) any other provision of this Agreement, the application of any such provision under circumstances different from those adjudicated by the court, or the validity or enforceability of this Agreement as a whole. The parties further agree to replace any such invalid, illegal or unenforceable portion with a valid and enforceable provision, which will achieve, to the maximum extent legally possible, the economic, business or other purposes of the invalid, illegal or unenforceable.

18. Construction

Unless otherwise indicated, all paragraph references are to the paragraph of this Agreement and all references to days are to calendar days (unless otherwise specified). Whenever, under the terms of this Agreement the time for performance of a covenant or condition falls upon a Saturday, Sunday or California state holiday, the time for

EXHIBIT A
SCOPE OF WORK

performance shall be extended to the next business day. The headings used in this Agreement are provided for convenience only and this Agreement shall be interpreted without reference to any headings. Wherever required by the context, the singular shall include the plural and vice versa, and the masculine gender shall include the feminine or neuter genders, or vice versa. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Facsimile or scanned (.pdf, .jpeg, etc.) images of signatures shall be treated as originals. The language in all parts of this Agreement shall be construed as a whole in accordance with its fair meaning, and shall not be construed against any Party solely by virtue of the fact that such Party or its counsel was primarily responsible for its preparation.

19. Governing Law

The rights and obligations of the parties and the interpretation and performance of this Agreement shall be governed in all respects by the laws of the State of California.

20. No Third-party Beneficiaries

Nothing in this Agreement, express or implied, is intended to confer any rights or remedies under or by reason of this Agreement on any person other than the parties to it and their respective permitted successors and assigns, nor is anything in this Agreement intended to relieve or discharge any obligation of any third person to any Party hereto or give any third person any right of subrogation or action over or against any Party to this Agreement.

21. Attachments

The attachments to this Exhibit A Scope of Work shall be deemed to be a part of this Agreement and are fully incorporated herein by reference. All capitalized terms

EXHIBIT A
SCOPE OF WORK

used in the attachments and not defined therein shall have the meaning as defined herein. The attachments are:

A-1: District Boundaries

A-2: High Speed Rail Segments Map

A-3: Construction Package 1A/1 B Map

A-4: CP 1A/1B Criteria Pollutants Estimate and Cost

A-5: Initial Deposit Invoice

A-6: Criteria Pollutant Offset Receipt

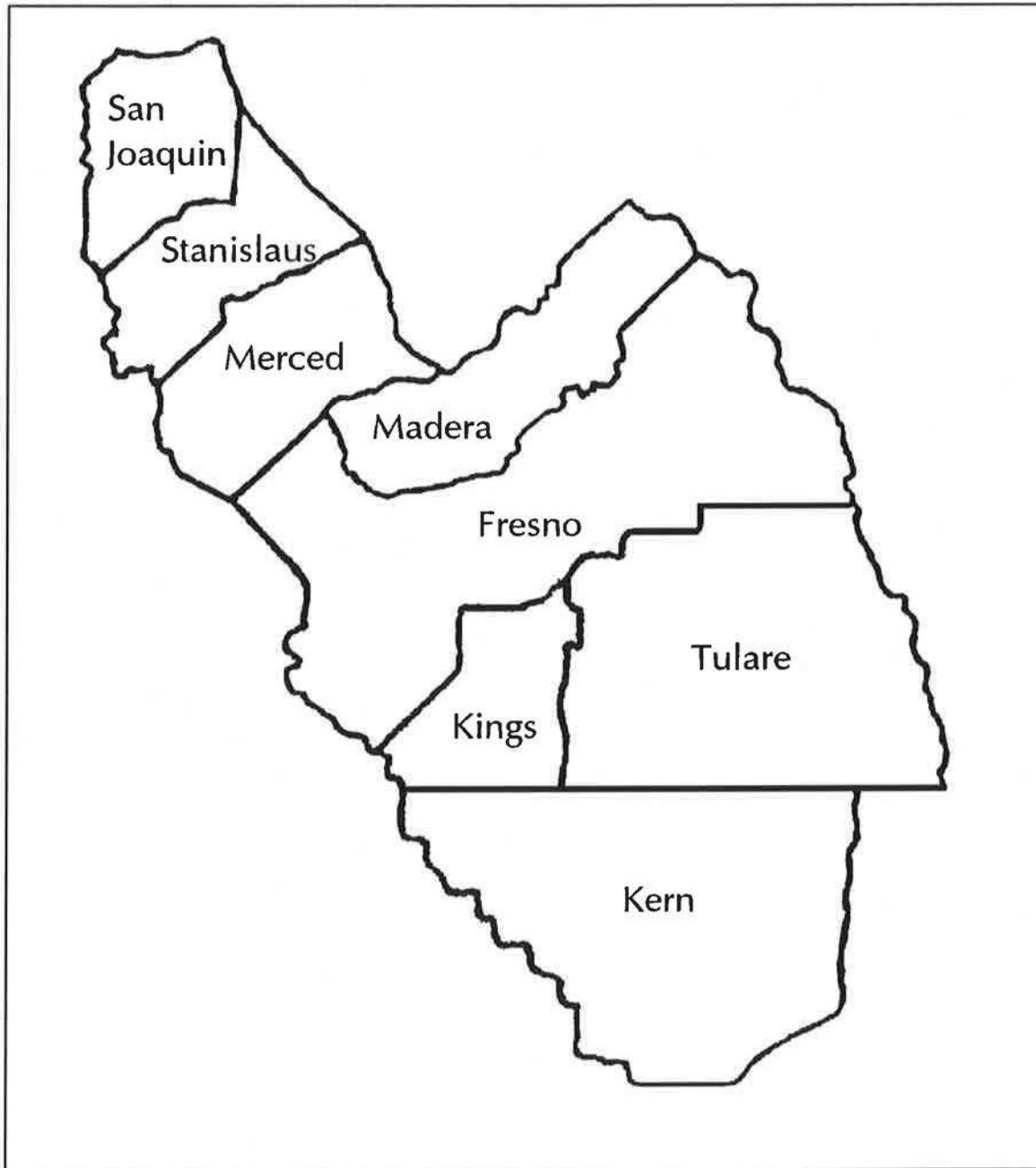
A-7: Construction Reporting Detail Information

A-8: Construction Report Format

22. Force Majeure

The time within which any Party shall be required to perform under this Agreement shall be extended on a day-per-day basis for each day during which such performance is prevented or delayed by reason of events reasonably outside of the control of the performing Party, including, without limitation, acts of God, events of destruction, acts of war, civil insurrection, strikes, shortages, non-Party governmental delays, non-Party moratoria, civil litigation and the like, and/or delays caused by the other Party's act or omission.

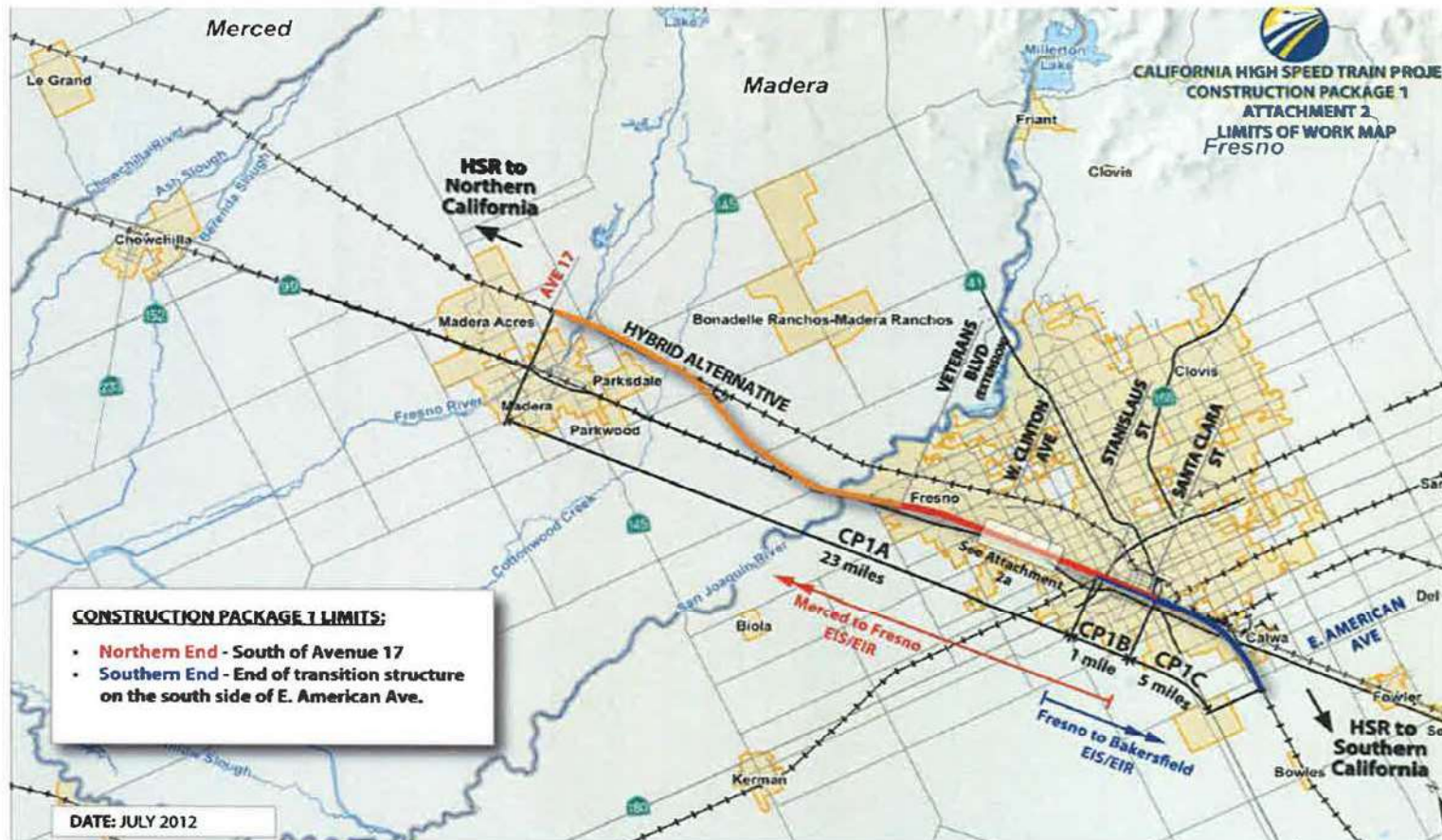
**ATTACHMENT A-1
DISTRICT BOUNDARIES**



ATTACHMENT A-2 HIGH SPEED RAIL SEGMENTS MAP



ATTACHMENT A-3
CONSTRUCTION PACKAGE 1A/1B MAP



ATTACHMENT A-4

CP 1A/1B OFFSET COST ESTIMATE

Pollutant	ROG/VOC	NOx	PMIO*
Tons to be Reduced - 2014	1.66	24.13	2.89
Tons to be Reduced - 2015	2.67	38.81	5.37
Tons to be Reduced - 2016	1.86	27.63	3.20
Tons to be Reduced - 2017	1.85	27.62	3.15
Tons to be Reduced - 2018 to 2022	0.00	0.00	0.00
Total for CP 1A/1B	8.04	118.19	14.61
Cost per ton (\$/Ton)	\$ 9,350.00	\$ 9,350.00	\$ 9,011.00
Emission Offset Funds	\$75,174	\$1,105,077	\$131,651
4% Administrative Cost (District Overhead)	\$3,007	\$44,203	\$5,266
CPIA/18 Offset Cost Estimate (including District Overhead)	\$1,364,377		
Agreement Funding Maximum	\$1,705,472		
*PM2.5 is included in PMIO			

ATTACHMENT A-5

INITIAL DEPOSIT INVOICE

INVOICE

San Joaquin Air Pollution Control District

Bill to Address

California High-Speed Rail Authority
770 L Street, Suite 800 Sacramento, CA
95814

Invoice Date:
Invoice No.:

Attn:

Project No:
Contract No:

For Initial Deposit as required by section 2.3 of the VERA Agreement _____ (District number) and
_____ (Authority number)

Construction Emissions Offsets

Total Contract Value \$ -

Current Invoice

Initial Deposit Amo

Total Amount Due \$ -

Contract Authorization Remaining \$ -

(Name/Title or person authorized to sign invoice)

Please Remit Payment to:

(San Joaquin Valley Air Pollution Control District)
(Address or other Bank Information)

ATTACHMENT A-6
CRITERIA POLLUTANT VERA OFFSETS RECEIPT

[On attached two (2) pages]

INVOICE
San Joaquin Valley Air Pollution Control District

Bill to Address

California High-Speed Rail Authority
770 L Street, Suite 800
Sacramento, CA 95814

Invoice Date:
Invoice No.:

Project No:
Contract No:

Attn:

For Emissions Reductions Secured and Certified as Detailed in the Attached, under the
Voluntary Emissions Reduction Agreement _____ (District number) and _____
(Authority number)

Total Contract Authorization Amount	\$
Previous Invoices Total	\$
Current Invoice (Including 4% administrative coat)	\$ - - - -
Total all Invoice	\$
Total Contract Authorization Remaining	\$

(Name of person authorized to sign Invoice)

Please Remit payment to:
San Joaquin Valley Air Pollution Control District
(Address or other Bank Information)



CRITERIA POLLUTANT VERA OFFSET RECEIPT

THIS RECEIPT IS PRESENTED TO CALIFORNIA HIGH-SPEED RAIL AUTHORITY CERTIFYING THE EMISSION REDUCTIONS LISTED BELOW HAVE BEEN SECURED THROUGH THIS AGREEMENT.



CALIFORNIA
High-Speed Rail Authority

HSR14-

AGREEMENT NUMBER	TOTAL PROJECT COST (INCLUDING ADMINISTRATIVE COST)	REPLACED EQUIPMENT TYPE	NEW EQUIPMENT TYPE	COST EFFECTIVENESS (\$/TONS)
C-21000	\$20,800.00	AGRICULTURAL TRACTOR	AGRICULTURAL TRACTOR	\$3,291.51

YEAR	NO _x REDUCTIONS (TONS)	PM ₁₀ REDUCTIONS (TONS)*	VOC REDUCTIONS (TONS)	TOTAL REDUCTIONS (TONS)
2014	2.65	0.15	0.43	3.23
2015	2.65	0.15	0.43	3.23
2016	2.65	0.15	0.43	3.23
2017	2.65	0.15	0.43	3.23
2018	2.65	0.15	0.43	3.23
2019	2.65	0.15	0.43	3.23
2020	2.65	0.15	0.43	3.23
2021	2.65	0.15	0.43	3.23
2022	2.65	0.15	0.43	3.23
2023	2.65	0.15	0.43	3.23
<i>TOTAL</i>	<i>26.5</i>	<i>1.50</i>	<i>4.30</i>	<i>32.3</i>

• * PM 2.5 IS INCLUDED IN PM10

ATTACHMENT A-7

CONSTRUCTION REPORTING INFORMATION

Contractor's Daily Record (From Authority's Environmental Mitigation Management and Assessment (EMMA) system)

- **Equipment (On- or Off-road)**
- **Serial Number**
- **Make, Model, Model Year**
- **Rated Horsepower**
- **Load Factor**
- **Fuel Type**
- **Hours Operated**
- **Construction Activity**

ATTACHMENT A-8
CONSTRUCTION REPORT FORMAT

On-site Sources (off-road equipment)

Step 1:

High Speed Rail Authority (HSRA) is to collect the following information associated with actual construction by construction activities: On-site off-road equipment, engine horsepower, engine model year, and total hours of operation by equipment type.

Step 2:

Upon completing step 1, HSRA is to quantify the actual construction emissions and prepare a Construction Report with the following content:

- Project Description and Location. Identify the following:
 - o VERA Number 20140105/ Indirect Source Review (ISR) project number 20130103
 - o Project/Segment Name (i.e - High Speed Rail project - Merced to Fresno; Fresno to Madera)
 - o 3-month Reporting Period Evaluated
 - o Date of Report
 - o Construction Package Number (e.g.: CP1A)
- On-site Actual Construction Criteria Pollutants Emissions (NOx, VOC, PM10, PM2.5) in pounds
 - o By equipment type
 - o By model year
 - o By horsepower
- Description of methodology used for the construction analysis (e.g.: CalEEMod, hand calculation with emission factors, etc.)

Off-site Sources (i.e. vehicles)

Step 1:

The Authority is to collect the following information associated with actual construction by construction activities: vehicle types (i.e - light auto, heavy duty trucks, etc, All construction vehicle trips, and associated total vehicle miles traveled by vehicle type.) by trip activity (i.e.: hauling, employee trips, etc.)

Step 2:

Upon completing step 1, HSRA is to quantify the actual construction emissions and include in the Construction Report with the following content:

- Project Description and Location. Identify the following:
 - o VERA number 20140105
 - o Project/Segment Name (i.e - High Speed Rail project - Merced to Fresno; Fresno to Madera)
 - o 3-month Reporting Period Evaluated
 - o Date of Report
 - o Construction Package Number (e.g.: CP1 A)
- Off-site Actual Construction Criteria Pollutants Emissions (i.e.: NOx, VOC, PM10, PM2.S) in pounds by type of trips:
 - o Employee trips: VMT by vehicle model year
 - o Hauling trips: VMT by vehicle model year
 - o Delivery trips: VMT by vehicle model year
- Description of methodology used for the construction analysis (e.g.: CalEEMod, hand calculation with emission factors, etc.)

EXHIBIT B
BUDGET DETAIL AND PAYMENT PROVISIONS

A. FUNDING REQUIREMENTS/BUDGET CONTINGENCY CLAUSES

1. It is mutually agreed that if the Legislature's Budget Act, Congressional Budget Act, of the current year (if amended or repealed) and/or any subsequent years covered under this Agreement does not appropriate sufficient funds for commencing pursuit of work under this contract, this Agreement may be terminated in accordance with Section SA.ii. of Exhibit A of this Agreement.
2. In addition, this Agreement is subject to any additional restrictions, limitations, conditions or any statute enacted by Congress or State Legislature that may affect the provisions, terms or funding of this Agreement in any manner.
3. If funding for any fiscal year is reduced or deleted by the Legislature's Budget Act or a Congressional Budget Act for purposes of this Agreement, the Authority shall have the option to terminate the Agreement in accordance with Section SA.ii. of this Agreement, or to otherwise offer an Agreement Amendment to the Contractor in accordance with Section 16 of the Agreement to reflect the reduced amount.

B. INVOICING

1. Criteria Pollutant VERA Offsets Receipts shall include the Authority's Agreement number listed on the front page of this Agreement and shall be processed in accordance with Exhibit A, except that the Contractor shall send two copies of each such Receipt (in addition to what is required in Exhibit A) to:

California High-Speed Rail Authority
Attention: Financial Operations Section
770 L Street, Suite 800
Sacramento, CA 95814

EXHIBIT C
GENERAL TERMS AND CONDITIONS

EXHIBITC

GENERAL TERMS AND CONDITIONS

1. APPROVAL: This Agreement is of no force or effect until signed by both parties and approved by the Department of General Services, if required. Contractor may not commence performance until such approval has been obtained.
2. AMENDMENT: No amendment or variation of the terms of this Agreement shall be valid unless made in writing, signed by the parties and approved as required. No oral understanding or Agreement not incorporated in the Agreement is binding on any of the parties.
3. ASSIGNMENT: This Agreement is not assignable by the Contractor, either in whole or in part, without the consent of the State in the form of a formal written amendment.
4. AUDIT: Contractor agrees that the awarding department, the Department of General Services, the Bureau of State Audits, or their designated representative shall have the right to review and to copy any records and supporting documentation pertaining to the performance of this Agreement. Contractor agrees to maintain such records for possible audit for a minimum of three (3) years after final payment, unless a longer period of records retention is stipulated. Contractor agrees to allow the auditor(s) access to such records during normal business hours and to allow interviews of any employees who might reasonably have information related to such records. Further, Contractor agrees to include a similar right of the State to audit records and interview staff in any subcontract and/or IIPFA related to performance of this Agreement. (Gov. Code §8546.7, Pub. Contract Code §10115 et seq., CCR Title 2, Section 1896).
5. INDEMNIFICATION: See Section 8 of Exhibit A.
6. DISPUTES: Contractor shall continue with the responsibilities under this Agreement during any dispute.
7. TERMINATION FOR CAUSE: The Authority may terminate this Agreement in accordance with Section 5A.ii.
8. INDEPENDENT CONTRACTOR: Contractor, and the agents and employees of Contractor, in the performance of this Agreement, shall act in an independent capacity and not as officers or employees or agents of the State.
9. RECYCLING CERTIFICATION: Not applicable because this Agreement does not involve the sale of products, materials, goods or supplies to the Authority.
10. NON-DISCRIMINATION CLAUSE: During the performance of this Agreement, Contractor and its subcontractors and/or IIPFA Equipment Users shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, physical disability (including HIV and AIDS),

EXHIBIT C
GENERAL TERMS AND CONDITIONS

mental disability, medical condition (e.g., cancer), age (over 40), marital status, denial of family care leave and denial of pregnancy disability leave. Contractor and subcontractors and/or IIPFA Equipment Users shall insure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. Contractor and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Gov. Code §12990 (a-f) et seq.) and the applicable regulations promulgated thereunder (California Code of Regulations, Title 2, Section 7285 et seq.). The applicable regulations of the Fair Employment and Housing Commission implementing Government Code Section 12990 (a-f), set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations, are incorporated into this Agreement by reference and made a part hereof as if set forth in full. Contractor and its subcontractors and/or IIPFA Equipment Users shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

Contractor shall include the nondiscrimination and compliance provisions of this clause in all subcontracts and/or IIPFAs.

11. CERTIFICATION CLAUSES: The CONTRACTOR CERTIFICATION CLAUSES contained in the document CCC 307 are hereby incorporated by reference and made a part of this Agreement by this reference as if attached hereto.

12. TIMELINESS: Time is of the essence in this Agreement.

13. COMPENSATION: The consideration to be paid Contractor, as provided herein, shall be in compensation for all of Contractor's expenses incurred in the performance hereof, including travel, per diem, and taxes, unless otherwise expressly so provided.

14. GOVERNING LAW: This contract is governed by and shall be interpreted in accordance with the laws of the State of California.

15. ANTITRUST CLAIMS: The Contractor by signing this agreement hereby certifies that if these services or goods are obtained by means of a competitive bid, the Contractor shall comply with the requirements of the Government Codes Sections set out below.

a. The Government Code Chapter on Antitrust claims contains the following definitions:

1) "Public purchase" means a purchase by means of competitive bids of goods, services, or materials by the State or any of its political subdivisions or public agencies on whose behalf the Attorney General may bring an action pursuant to subdivision (c) of Section 16750 of the Business and Professions Code.

2) "Public purchasing body" means the State or the subdivision or agency making a public purchase. Government Code Section 4550.

b. In submitting a bid to a public purchasing body, the bidder offers and agrees that if the bid is accepted, it will assign to the purchasing body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the

EXHIBIT C
GENERAL TERMS AND CONDITIONS

Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the bidder for sale to the purchasing body pursuant to the bid. Such assignment shall be made and become effective at the time the purchasing body tenders final payment to the bidder. Government Code Section 4552.

c. If an awarding body or public purchasing body receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under this chapter, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the public body any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the public body as part of the bid price, less the expenses incurred in obtaining that portion of the recovery. Government Code Section 4553.

d. Upon demand in writing by the assignor, the assignee shall, within one year from such demand, reassign the cause of action assigned under this part if the assignor has been or may have been injured by the violation of law for which the cause of action arose and (a) the assignee has not been injured thereby, or (b) the assignee declines to file a court action for the cause of action. See Government Code Section 4554.

16. CHILD SUPPORT COMPLIANCE ACT: For any Agreement in excess of \$100,000, the contractor acknowledges in accordance with Public Contract Code 7110, that:

a. The contractor recognizes the importance of child and family support obligations and shall fully comply with all applicable state and federal laws relating to child and family support enforcement, including, but not limited to, disclosure of information and compliance with earnings assignment orders, as provided in Chapter 8 (commencing with section 5200) of Part 5 of Division 9 of the Family Code; and

b. The contractor, to the best of its knowledge is fully complying with the earnings assignment orders of all employees and is providing the names of all new employees to the New Hire Registry maintained by the California Employment Development Department.

17. UNENFORCEABLE PROVISION: In the event that any provision of this Agreement is unenforceable or held to be unenforceable, then the parties agree that all other provisions of this Agreement have force and effect and shall not be affected thereby.

18. PRIORITY HIRING CONSIDERATIONS: If this Contract includes services in excess of \$200,000, the Contractor shall give priority consideration in filling vacancies in positions funded by the Contract to qualified recipients of aid under Welfare and Institutions Code Section 11200 in accordance with Pub. Contract Code §10353.

19. SMALL BUSINESS PARTICIPATION AND DVBE PARTICIPATION REPORTING REQUIREMENTS:

EXHIBIT C
GENERAL TERMS AND CONDITIONS

a. If for this Contract Contractor made a commitment to achieve small business participation, then Contractor must within 60 days of receiving final payment under this Contract (or within such other time period as may be specified elsewhere in this Contract) report to the awarding department the actual percentage of small business participation that was achieved. (Govt. Code § 14841.)

b. If for this Contract Contractor made a commitment to achieve disabled veteran business enterprise (DVBE) participation, then Contractor must within 60 days of receiving final payment under this Contract (or within such other time period as may be specified elsewhere in this Contract) certify in a report to the awarding department: (1) the total amount the prime Contractor received under the Contract; (2) the name and address of the DVBE(s) that participated in the performance of the Contract; (3) the amount each DVBE received from the prime Contractor; (4) that all payments under the Contract have been made to the DVBE; and (5) the actual percentage of DVBE participation that was achieved. A person or entity that knowingly provides false information shall be subject to a civil penalty for each violation. (Mil. & Vets. Code§ 999.5(d); Govt. Code§ 14841.)

20. LOSS LEADER:

If this contract involves the furnishing of equipment, materials, or supplies then the following statement is incorporated: It is unlawful for any person engaged in business within this state to sell or use any article or product as a "loss leader" as defined in Section 17030 of the Business and Professions Code. (PCC 10344(e).)

EXHIBIT D
SPECIAL TERMS AND CONDITIONS

1. AMENDMENT (CHANGE IN TERMS)

No amendment or variation of the terms of this agreement shall be valid unless made in writing, signed by the parties, and approved as required. No oral understanding or agreement not incorporated in agreement is binding on any of the parties.

The DISTRICT shall only commence work covered by an amendment after the amendment is executed and notification to proceed has been provided in writing by the AUTHORITY's Contract Manager.

2. DISPUTES

The Parties shall continue with their respective responsibilities under this Agreement during any work dispute.

3. DISTRICT'S DELIVERABLES UNDER EARLY TERMINATION

Upon termination, the DISTRICT shall provide all project-related documents and correspondence required as part of the Scope of Work (Exhibit A). Project-related documents shall include all documents that are in complete and final form and which have been accepted as complete by the AUTHORITY, or documents in draft and/or incomplete form for those deliverables, which are in progress by the DISTRICT and have not been accepted as complete.

4. RETENTION OF RECORD/AUDITS

For the purpose of determining compliance with Public Contract Code Section 10115, et seq. and Title 21, California Code of Regulations, Chapter 21, Section 2500 et seq., when applicable, and other matters connected with the performance of the Agreement pursuant to Government Code Section 8546.7, the DISTRICT, IIPFA Equipment Users, and the AUTHORITY shall maintain all books, documents, papers, accounting records, and other evidence pertaining to the performance of the Agreement, including but not limited to, the costs of administering the Agreement. All parties shall make such materials available at their respective offices at all reasonable times during the Agreement period and for three (3) years from the date of expenditure under this Agreement. The AUTHORITY, the State Auditor, or any duly authorized representative having jurisdiction under any laws or regulations shall have access to any books, records, and documents of the DISTRICT that are pertinent to the Agreement for audits, examinations, excerpts, and transactions, and copies thereof shall be furnished if requested.

Any IIPFA in excess of \$25,000.00, entered into as a result of this Agreement, shall contain all the provisions of this clause.

EXHIBIT D
SPECIAL TERMS AND CONDITIONS

5. AUDIT REVIEW PROCEDURES

Any dispute concerning a question of fact arising under an interim or post audit of this Agreement that is not disposed of by agreement shall be reviewed by the Contract Manager.

Not later than 30 days after issuance of an interim or final audit report, the DISTRICT may request a review by the Contract Manager of unresolved audit issues. The request for review will be submitted in writing to the Authority's Chief Executive Officer (CEO). The request must contain detailed information of the factors involved in the dispute as well as justifications for reversal. A meeting by the CEO will be scheduled if the Contract Manager concurs that further review is warranted. After the meeting, the Contract Manager will make recommendations to the CEO who will make the final decision for the AUTHORITY. The final decision will be made within three (3) months of receipt of the notification of dispute.

Neither the pendency of a dispute nor its consideration by AUTHORITY will excuse the DISTRICT from full and timely performance, in accordance with the terms of this clause.

6. IIPFAs

Nothing contained in this Agreement or otherwise, shall create any obligation of the Authority or State flowing or owing to any IIPFA Equipment User

7. CONFIDENTIALITY OF DATA

The parties acknowledge that this Agreement is subject to the California Public Records Act (Govt. Code Section 6250 et seq.), California Government Code Section 11019.9; and California Civil Code Section 1798 et seq. However, all financial, statistical, personal, technical, or other data and information relative to the AUTHORITY's operations, which is designated confidential by the AUTHORITY and made available to the DISTRICT in order to carry out this Agreement, shall be protected by the DISTRICT from unauthorized use and disclosure.

8. STATEMENT OF COMPLIANCE

The DISTRICT's signature affixed herein and dated shall constitute a certification under penalty of perjury under the laws of the State of California that the DISTRICT has, unless exempt, complied with the nondiscrimination program requirements of Government Code Section 12990 and Title 2, California Code of Regulations, Section 8103.

9. CONFLICT OF INTEREST

The DISTRICT hereby certifies that it does not now have nor shall it acquire any financial or business interest that would conflict with the rP.form,mr.P. of services under this Agreement.

10. REBATES, KICKBACKS OR OTHER UNLAWFUL CONSIDERATION

The DISTRICT warrants that this Agreement was not obtained or secured through rebates, kickbacks or other unlawful consideration either promised or paid to any AUTHORITY

EXHIBIT D
SPECIAL TERMS AND CONDITIONS

agency employee. For breach or violation of this warranty, the AUTHORITY shall have the right, in its discretion, to terminate this Agreement without liability, to pay only for the value of the work actually performed, or to deduct from this Agreement price or otherwise recover the full amount of such rebate, kickback or other unlawful consideration.

11. PROHIBITION OF EXPENDING STATE FUNDS FOR LOBBYING

The DISTRICT certifies, to the best of his or her knowledge and belief, that:

- No State appropriated funds have been paid or will be paid, by or on behalf of the DISTRICT, to any person for influencing or attempting to influence an officer or employee of any State agency, a Member of the State Legislature or United States Congress, an officer or employee of the Legislature or Congress, or any employee of a Member of the Legislature or Congress in connection with the awarding of any State agreement, the making of any State grant, the making of any State, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any State agreement, grant, loan, or cooperative agreement.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000.00 and not more than \$100,000.00 for each such failure.

EXHIBIT E
CONDITIONS FOR CONTRACTS RECEIVING FEDERAL FUNDING
AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 (ARRA)

A FEDERAL REQUIREMENTS

The Contractor understands that the Authority has received Federal funding from FRA that will be used to fund this Agreement. Accordingly, Contractor acknowledges that applicable federal laws, regulations, policies and related administrative practices, including as they may change over the life of this VERA, will govern the administration of that funding, which could affect this VERA and its requirements, whether or not they are specifically referenced herein. The Contractor shall ensure its IIPFAs include specific notice that Federal law requirements, regulations and policies may change and could affect reporting and other requirements of the IIPFA but would not affect funding in any IIPFA.

The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any reasonable Authority requests, which would cause the Authority to be in violation of FRA requirements.

B ACCESS REQUIREMENTS FOR INDIVIDUALS WITH DISABILITIES

The Contractor agrees to comply with all applicable requirements regarding Access for Individuals with Disabilities contained in the Americans with Disabilities Act of 1990 (ADA), as amended, 42 U.S.C. §§ 12101 et seq.; and Section 504 of the Rehabilitation Act of 1973, as amended, 29 U.S.C. § 794 ("Nondiscrimination under Federal grants and programs"). Contractor shall ensure IIPFAs include requirements to so comply.

C ENVIRONMENTAL REQUIREMENTS

The Contractor and IIPFA Equipment Users shall comply with all applicable environmental requirements and regulations, as follows:

The Contractor will conduct work under this Agreement in compliance with the following laws, as modified from time to time, all of which are incorporated herein by reference:

1. Section 114 of the Clean Air Act, 42 U.S.C. 7414, and section 308 of the Federal Water Pollution Control Act, 33 U.S.C. 1318, and all regulations issued thereunder.
2. The Contractor certifies that no facilities that will be used to perform work under this Agreement are listed on the List of Violating Facilities maintained by the U.S. Environmental Protection Agency ("EPA"). The Contractor will notify the Authority as soon as it or any IIPFA Equipment User receives any communication from the EPA indicating that any facility which will be used to perform work pursuant to this Agreement is under consideration to be listed on the EPA's List of Violating Facilities; provided, however, that the Contractor's duty of notification hereunder shall extend only to those communications of which it is aware.

D ENERGY CONSERVATION

EXHIBIT E
CONDITIONS FOR CONTRACTS RECEIVING FEDERAL FUNDING
AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 (ARRA)

The Contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the State energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. 6421 et seq.).

E. FRAUD AND FALSE OR FRAUDULENT STATEMENTS, AND RELATED ACTS

1. The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986 (6 C.F.R. 13), as amended, 31 U.S.C. § 3801 et seq., and USDOT regulations Program Fraud Civil Remedies (49 C.F.R. Part 31), apply to its actions under this Agreement. Upon execution of this Agreement, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the Agreement and or the FRA assisted project for which this Agreement is being made. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 as cited above on the Contractor to the extent the Federal Government deems appropriate.
2. The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FRA, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307 (n)(1) on the Contractor, to the extent the Federal Government deems appropriate.
3. The Contractor agrees to include the above two paragraphs in each IIPFA. It is further agreed that the paragraphs shall not be modified, except to identify the IIPFA Equipment User who will be subject to the provisions.

F. NO OBLIGATION BY THE FEDERAL GOVERNMENT

1. The Authority and the Contractor acknowledge and agree that, notwithstanding any concurrence by the federal government in or approval of this Agreement, absent the express written consent by the federal government, the federal government is not a party to this Agreement and shall not be subject to any obligations or liabilities to the Contractor or any IIPFA Equipment User.
2. The Contractor agrees to include the above paragraph in each IIPFA financed in whole or in part with federal assistance provided by FRA. It is further agreed that the paragraph shall not be modified, except to identify the IIPFA Equipment User who will be subject to its provisions.

G. DEBARMENT AND SUSPENSION

EXHIBIT E
CONDITIONS FOR CONTRACTS RECEIVING FEDERAL FUNDING
AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 (ARRA)

1. This Contract is a covered transaction for purposes of 2 C.F.R. 1200. As such, the Contractor is required to comply with applicable provisions of Executive Orders Nos. 12549 and 12689, "Debarment and Suspension," 31 U.S.C. § 6101 note, and U.S. DOT regulations, "Non-procurement Suspension and Debarment," 2 C.F.R. Part 1200, which adopt and supplement the provisions of U.S. Office of Management and Budget (U.S. OMB) "Guidelines to Agencies on Government-wide Debarment and Suspension (Non-procurement)," 2 C.F.R. Part 180.
2. To the extent required by the aforementioned U.S. DOT regulations and U.S. OMB guidance, the Contractor must verify that each IIPFA Equipment User is not excluded or disqualified in accordance with said regulations by going to <https://www.sam.gov/portal/public/SAM/> and using the Search Records function to search by party name to see if that party is Excluded.

H. CIVIL RIGHTS

The following requirements apply to the Contract:

1. NONDISCRIMINATION

In accordance with Title VI of the Civil Rights Act, as amended; 42 U.S.C. § 2000d, Section 303 of the Age Discrimination Act of 1975, as amended; 42 U.S.C. § 6102, Section 202 of the Americans with Disabilities Act of 1990; 42 U.S.C. § 12132; and 49 U.S.C. § 306, the Contractor agrees that it will not discriminate against any individual because of race, color, religion, national origin, sex, age or disability in any activities leading up to or in performance of the Contract. In addition, the Contractor agrees to comply with applicable federal implementing regulations and other implementing requirements that FRA may issue.

2. EQUAL EMPLOYMENT OPPORTUNITY

The following equal employment opportunity requirements apply to the Contract:

3. RACE, COLOR, RELIGION, NATIONAL ORIGIN, SEX

In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, the Contractor agrees to comply with all applicable equal opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," including 41 C.F.R. 60 et seq. (which implements Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable federal statutes, executive orders, regulations, and federal policies that may in the future affect activities undertaken to implement this Agreement. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are

EXHIBIT E
CONDITIONS FOR CONTRACTS RECEIVING FEDERAL FUNDING
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treated during employment, without regard to their race, color, religion, national origin, sex, or age. Such action shall include the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements FRA may issue.

AGE

In accordance with Section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § 623, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements FRA may issue.

DISABILITIES

In accordance with Section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements FRA may issue.

The Contractor also agrees not to discriminate on the basis of drug abuse, in accordance with the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, alcohol abuse, in accordance with the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, and to comply with Sections 523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§ 290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records. In addition, the Contractor agrees to comply with applicable federal implementing regulations and other implementing requirements that FRA may issue.

EXHIBIT E
CONDITIONS FOR CONTRACTS RECEIVING FEDERAL FUNDING
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I ACCESS TO AND INSPECTION OF RECORDS

1. The Contractor agrees to provide the Authority, the Secretary of the U.S. Department of Transportation, the FRA Administrator, the Comptroller General of the United States, the appropriate Inspector General appointed under Section 3 or 8G of the United States Inspector General Act of 1978, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this Agreement for the purposes of making audits, examinations, excerpts, and transcriptions.
2. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed, and to permit interview by any of the foregoing parties of any officer or employee of Contractor.
3. The Contractor agrees to maintain all books, records, accounts, and reports required under this Agreement for a period of not less than seven years after the date of termination or expiration of this Agreement, except in the event of litigation or settlement of claims arising from the performance of this Agreement, in which case the Contractor agrees to maintain same until the Authority, the FRA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Reference 49 C.F.R. § 18.39(i)(11); see also ARRA Sections 902, 1514 and 1515.

J DISADVANTAGED BUSINESS ENTERPRISES

1. The Authority encourages the Contractor to utilize small business concerns owned and controlled by socially and economically disadvantaged individuals (as that term is defined for certain USDOT agencies in Title VI) in carrying out this Agreement.
2. The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. The Contractor shall carry out applicable requirements of Title VI in the administration of this Agreement. Failure by the Contractor to carry out these requirements is a material breach of this Agreement, which may result in the termination of this Agreement or such other remedy as the Authority deems appropriate.

EXHIBIT E
CONDITIONS FOR CONTRACTS RECEIVING FEDERAL FUNDING
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K ARRA-Funded Project

Funding for this Agreement has been provided through the American Recovery and Reinvestment Act (ARRA) of 2009, Pub. L 111-5. Contractor and IIPFA Equipment Users are subject to audit by appropriate federal or State entities.

L Recovery of Misspent Funds

The Contractor agrees that if the Contractor or any IIPFA Equipment User uses any funds provided through this Agreement for purposes other than as required by this Agreement, the Authority may recover misspent funds following an audit. This provision is in addition to all other remedies available to the Authority under all applicable state and federal laws.

M Prohibition on Use of ARRA Funds

The Contractor agrees in accordance with ARRA, Provision 1604, that none of the funds made available under this contract may be used for any casino or other gambling establishment, aquarium, zoo, golf course, or swimming pools.

N Whistleblower Protection

The Contractor agrees that it shall comply with Section 1553 of the ARRA, which prohibits all non-federal contractors, including the State, and all contractors of the State, from discharging, demoting or otherwise discriminating against an employee for disclosures by the employee that the employee reasonably believes are evidence of any of the following:

1. Gross mismanagement of a contract relating to ARRA funds
2. A gross waste of ARRA funds
3. A substantial and specific danger to public health or safety related to the implementation or use of ARRA funds
4. An abuse of authority related to implementation or use of ARRA funds
5. A violation of law, rule, or regulation related to an agency contract (including the competition for or negotiation of a contract) awarded or issued relating to ARRA funds

The Contractor agrees that it shall post notice of the rights and remedies available to employees under Section 1553 of Title XV of Division A of the ARRA.

O. False Claims Act

The Contractor agrees that it shall promptly notify the Authority and shall refer to an appropriate federal inspector general any credible evidence that a principal, employee,

EXHIBIT E
CONDITIONS FOR CONTRACTS RECEIVING FEDERAL FUNDING
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agent, IIPFA Equipment User or other person has committed a false claim under the False Claims Act (31 U.S.C. §3729 et seq.) or has committed a criminal or civil violation of laws pertaining to fraud, conflict of interest, bribery, gratuity, or similar misconduct involving ARRA funds.

P. Reporting Requirements

Pursuant to Section 1512(c) and other sections of the ARRA, the Authority must submit periodic reports to FRA about how ARRA funds are being spent, where, by whom, on what, etc. The Authority reasonably believes that the information required from the District set forth in Exhibit A, such as the information IIPFAs and the District's quarterly Status Reports must contain, will enable the Authority to meet its ARRA reporting requirements to FRA.

However, the District agrees to provide any additional information related to this Agreement and its implementation that the Authority needs to satisfy its reporting obligations to FRA under ARRA. The Authority agrees to compensate the District, if the District so requests, for any material additional time the District must spend (beyond the activities the District is required to perform under this Agreement absent the need to collect and report such additional information) to provide such additional information, at the District's staff-time rates the District then is charging similarly-situated third parties for its services (the District must document those rates and the additional time spent).

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CALIFORNIA

High-Speed Rail Authority

July 7, 2021

Bret Banks
Antelope Valley AQMD
43301 Division Street
Suite 206
Lancaster, CA 93535

Re: General Conformity for the Bakersfield to Palmdale Section of California High-Speed Rail

Dear Bret Banks:

Purpose

The purpose of this letter is to document the commitment to satisfy General Conformity (GC) for the Bakersfield to Palmdale Section of the California High-Speed Rail project with the Antelope Valley Air Quality Management District (AVAQMD).

Project

The California High-Speed Rail (HSR) System will provide intercity, high-speed service on more than 800 miles of guideway throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the southern Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The Bakersfield to Palmdale HSR Section ("Project" or "Action") is a critical link connecting the Merced to Fresno, and Bakersfield to Palmdale HSR sections to the Palmdale to Los Angeles HSR sections.¹

General Conformity Rule

The General Conformity Rule, as codified in Title 40 Code of Federal Regulations Part 93, Subpart B, establishes the process by which federal agencies determine conformance of proposed projects that are federally funded or require federal approval with applicable air quality standards. This determination must demonstrate that a Proposed Action would not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions towards attainment. The California High-Speed Rail Authority (Authority), as the Action proponent, is receiving federal grant funds through the Federal Railroad Administration's (FRA) High-Speed Intercity Passenger Rail program. The Action may also receive FRA safety approvals. Because of the federal funding and potential safety approvals, the Action is subject to the General Conformity Rule; and because construction-phase emissions (without mitigation) would exceed General Conformity *de minimis* thresholds, the Action is not exempt and must demonstrate conformity.

General Conformity Determination

The draft General Conformity Determination documents FRA's finding that the Action complies with the General Conformity Rule and that it conforms to the purposes of the area's approved State Implementation Plan and is consistent with all applicable requirements. The draft General

¹As part of its first phase, the California HSR system is currently planned as seven distinct sections from San Francisco in the north to Los Angeles and Anaheim in the south.

Conformity Determination is being issued for public review and comment concurrent with the publication of the *Bakersfield to Palmdale Section Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS)*.

The draft General Conformity Determination is based on the Impact Avoidance and Minimization Measures (IAMF) and Mitigation Measures (MM) that are described in Section 3.3.8 of the EIR/EIS and that will be implemented for the Action. This compliance is demonstrated as follows:

The operation of the Action would result in a reduction of regional emissions of all applicable air pollutants and would not cause a localized exceedance of an air quality standard; and

Whereas emissions generated during the construction of the Action would exceed General Conformity thresholds for one pollutant, these emission increases would be offset through the Air Quality Investment Program in the Antelope Valley Air Quality Management District (AVAQMD).

Based on the current emissions analysis, construction emissions exceed General Conformity *de minimis* thresholds for nitrogen oxides (NO_x) in the AVAQMD. These exceedances are based on current construction schedule and equipment estimates. It should be noted that the emission numbers provided in the Authority's EIR/EISs are reasonable estimates based on the available information to date. The methodology used in creating these estimates is similar to what was used for estimating the emissions for the Merced to Fresno and Fresno to Bakersfield project section environmental documents. After seven years of construction in the central valley, it has become clear that the estimates in the EIR/EIS are conservative and actual emissions from construction are currently lower than estimates by 50-70%.

The Authority has a long history of being proactive towards reducing construction emissions. As shown in Figure 1, the Authority has continually updated its policies and procedures to ensure that the project embraces and pushes the boundaries towards reducing emissions.

Impact Avoidance and Minimization Features

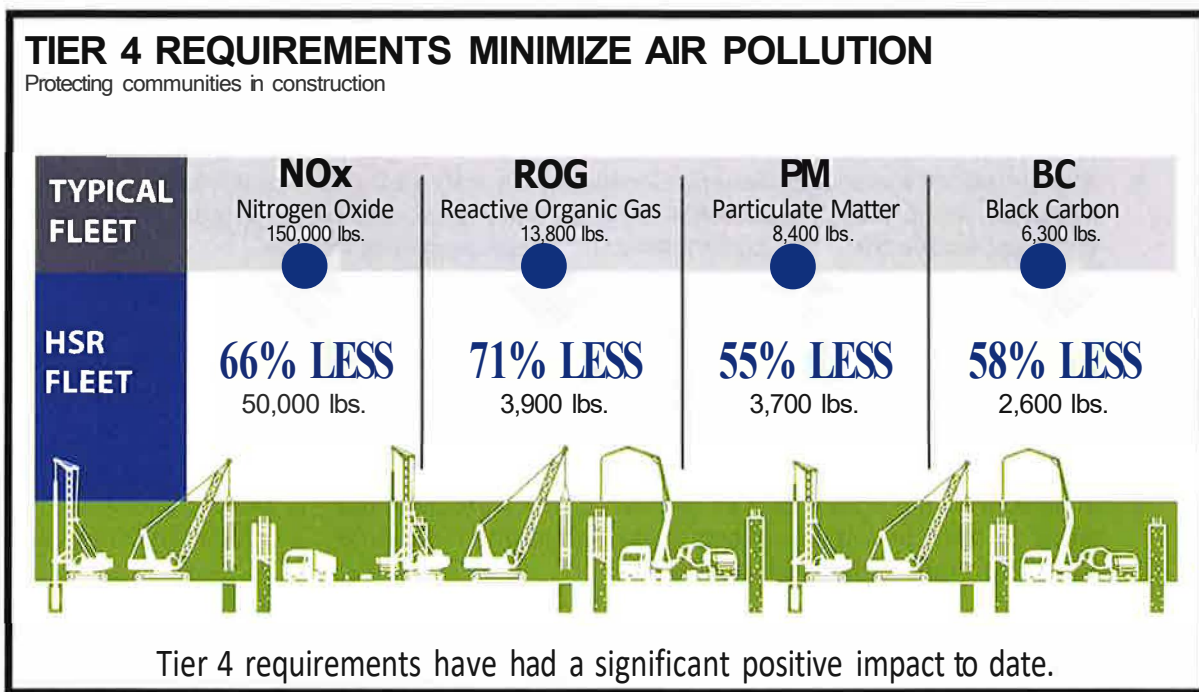
Avoiding and minimizing emissions is a strategy that is consistent with the net-zero greenhouse gas objectives of the Authority's Sustainability Policy. As such, the Authority has incorporated the following Impact Avoidance and Minimization Features (IAMF) into the project:

- **AQ-IAMF#1: Fugitive Dust Emissions:** The contractor would employ several control measures to minimize and control fugitive dust emissions and prepare a fugitive dust control plan for each distinct construction segment.
- **AQ-IAMF#2: Selection of Coatings:** The contractor would use lower VO_E content paint than that required by SCAQMD Rule 1113.
- **AQ-IAMF#3: Renewable Diesel:** The contractor would use renewable diesel fuel to minimize and control exhaust emissions from all heavy-duty diesel-fueled construction diesel equipment and on-road diesel trucks.
- **AQ-IAMF#4: Reduce Criteria Exhaust Emissions from Construction Equipment:** All heavy-duty off-road construction diesel equipment used during the construction phase would meet Tier 4 engine requirements.

- **AQ-IAMF#5: Reduce Criteria Exhaust Emissions from On-Road Construction Equipment:** All on-road trucks would consist of model year 2010 or newer.
- **AQ-IAMF#6: Reduce the Potential Impact of Concrete Batch Plants:** The contractor would prepare a technical memorandum documenting the concrete batch plant siting criteria, including locating the plant at least 1,000 feet from sensitive receptors, and utilization of typical control measures.

These IAMFs have helped to reduce the construction emissions generated by the project. For example, Figure 1 highlights the significant criteria pollutant emission reductions demonstrated by the project due to the IAMF#4.

Figure 1 - Emission Savings due to Tier 4 Equipment in 2020



Future Emissions Estimates

Since funding has not been fully secured for this project section, construction emissions would be re-visited and re-calculated after funding is secured, prior to the implementation of any offset programs. As such, the following steps will be followed to demonstrate conformity:

- Once construction funding is secured for the project section, a revised construction schedule will be developed.
- Based on the new schedule, a construction plan will be developed and analyzed to determine the emission burdens generated by construction.
- At the time of analysis, the IAMFs and MMs will be revisited and updated to include technologies and methodologies that were not considered in the earlier analysis. This

review and implementation of updated measures will aid the project in reducing the generation of emissions due to construction.

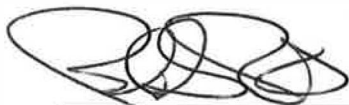
- Once emission estimates are calculated using the revised IAMF and MMs, it will be determined if the estimates are still above the applicable General Conformity de minimis thresholds.
- All affected air districts will be notified of the emission levels and consulted to offset emissions for those years/pollutants that exceed General Conformity de minimis thresholds. Alternatively, the air districts could include these emissions in the applicable State Implementation Plan (SIP).
- The emission accounting program the Authority uses to track emissions for the segments currently being constructed will be utilized to actively quantify the construction emissions generated by the project.

Conclusion

As such, by signing this letter, the Authority and the air districts commit to the following:

- The Authority will work with the air district in order to ensure that the lowest level of construction emissions are generated through the use of mitigation measures outlined in this document and rolling review of best available technologies.
- Any emissions exceeding General Conformity de minimis thresholds will be completely mitigated, in the year of occurrence, through either existing offset programs or inclusion in the applicable SIP. The current emission offset programs include:
 - o Air Quality Investment Program (AQIP) with the Antelope Valley Air Quality Management District (AVAQMD). The AQIP is a voluntary emission reduction compliance option, in which moneys are paid by an AQIP Clean Air Investor to the District for use to fund stationary and mobile source emission reduction strategies that will achieve emission reductions (<https://avaqmd.ca.gov/files/c97c5e2cf/AV2501.pdf>).
- In addition to the above, and as discussed with AVAQMD, there is also an option for those air districts to utilize offsets obtained through the SJVAPCD's Voluntary Emission Reduction Agreement (VERA) program.
- The Authority and the air district will enter into a contractual agreement to mitigate the project's emissions, as required by General Conformity regulations, by providing funds for the applicable offset program to fund grants for projects that achieve the necessary emission reductions.
- The air district will seek and implement the necessary emission reduction measures, using Authority funds; and
- The air district will serve in the role of administrator of the emissions reduction projects and verifier of the successful mitigation effort.

As such, General Conformity will be satisfied for this project section.



Brett Banks, AVAQMD



July 7, 2021

Glen Stephens
Eastern Kern Air Pollution Control District
2700 "M" Street, Suite 302
Bakersfield, California 93301-2370

Re: General Conformity for the Bakersfield to Palmdale Section of California High-Speed Rail

Dear Glen Stephens:

Purpose

The purpose of this letter is to document the commitment to satisfy General Conformity (GC) for the Bakersfield to Palmdale Section of the California High-Speed Rail project with the Eastern Kern Air Pollution Control District (EKAPCD).

Project

The California High-Speed Rail (HSR) System will provide intercity, high-speed service on more than 800 miles of guideway throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the southern Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The Bakersfield to Palmdale HSR Section ("Project" or "Action") is a critical link connecting the Merced to Fresno, and Bakersfield to Palmdale HSR sections to the Palmdale to Los Angeles HSR sections.¹

General Conformity Rule

The General Conformity Rule, as codified in Title 40 Code of Federal Regulations Part 93, Subpart B, establishes the process by which federal agencies determine conformance of proposed projects that are federally funded or require federal approval with applicable air quality standards. This determination must demonstrate that a Proposed Action would not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions towards attainment. The California High-Speed Rail Authority (Authority), as the Action proponent, is receiving federal grant funds through the Federal Railroad Administration's (FRA) High-Speed Intercity Passenger Rail program. The Action may also receive FRA safety approvals. Because of the federal funding and potential safety approvals, the Action is subject to the General Conformity Rule; and because construction-phase emissions (without mitigation) would exceed General Conformity *de minimis* thresholds, the Action is not exempt and must demonstrate conformity.

General Conformity Determination

The draft General Conformity Determination documents FRA's finding that the Action complies with the General Conformity Rule and that it conforms to the purposes of the area's approved State Implementation Plan and is consistent with all applicable requirements. The draft General Conformity Determination is being issued for public review and comment concurrent with the

¹ As part of its first phase, the California HSR system is currently planned as seven distinct sections from San Francisco in the north to Los Angeles and Anaheim in the south.

publication of the *Bakersfield to Palmdale Section Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS)*.

The draft General Conformity Determination is based on the Impact Avoidance and Minimization Measures (IAMF) and Mitigation Measures (MM) that are described in Section 3.3.8 of the EIR/EIS and that will be implemented for the Action. This compliance is demonstrated as follows:

- The operation of the Action would result in a reduction of regional emissions of all applicable air pollutants and would not cause a localized exceedance of an air quality standard; and
- Whereas emissions generated during the construction of the Action would exceed General Conformity thresholds for one pollutant, these emission increases would be offset through the Emission Banking Certificate Program in the Eastern Kern Air Pollution Control District (EKAPCD).

Based on the current emissions analysis, construction emissions exceed General Conformity *de minimis* thresholds for nitrogen oxides (NO_x) in the EKAPCD. These exceedances are based on current construction schedule and equipment estimates. It should be noted that the emission numbers provided in the Authority's EIR/EISs are reasonable estimates based on the available information to date. The methodology used in creating these estimates is similar to what was used for estimating the emissions for the Merced to Fresno and Fresno to Bakersfield project section environmental documents. After seven years of construction in the central valley, it has become clear that the estimates in the EIR/EIS are conservative and actual emissions from construction are currently lower than estimates by 50-70%.

The Authority has a long history of being proactive towards reducing construction emissions. As shown in Figure 1, the Authority has continually updated its policies and procedures to ensure that the project embraces and pushes the boundaries towards reducing emissions.

Impact Avoidance and Minimization Features

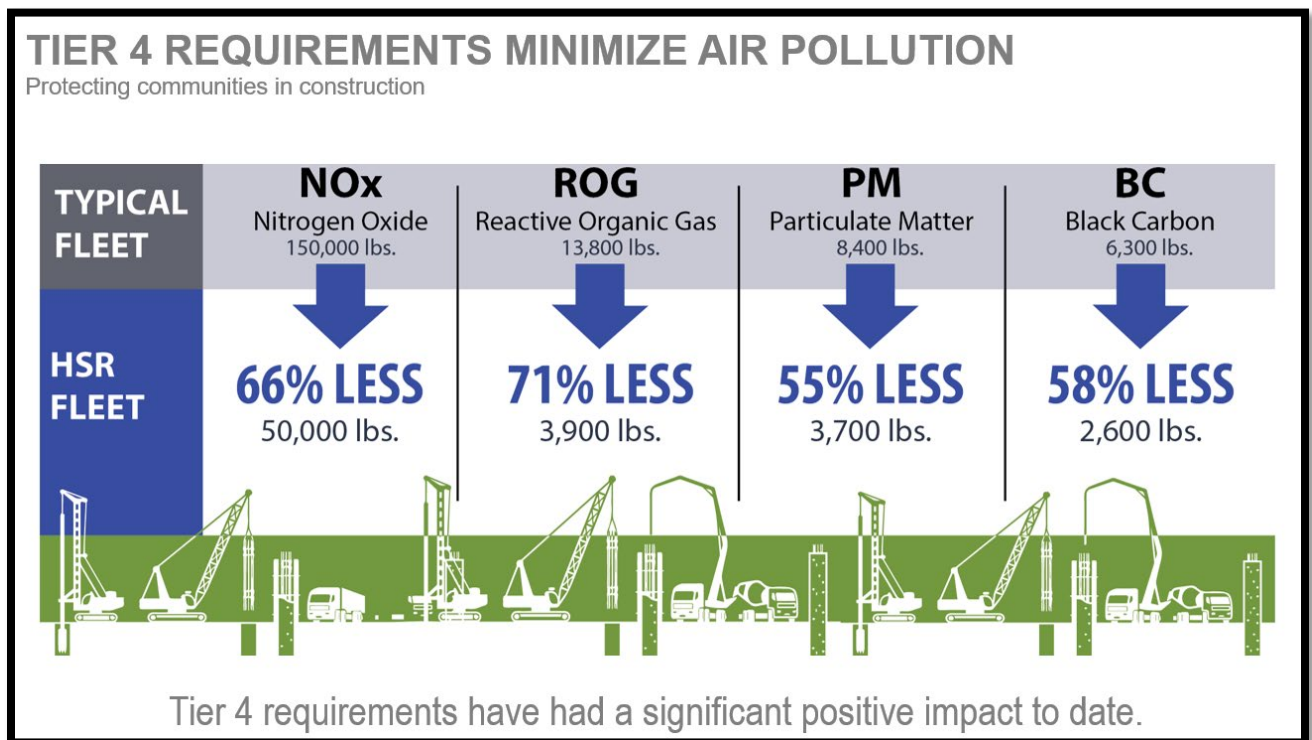
Avoiding and minimizing emissions is a strategy that is consistent with the net-zero greenhouse gas objectives of the Authority's Sustainability Policy. As such, the Authority has incorporated the following Impact Avoidance and Minimization Features (IAMF) into the project:

- **AQ-IAMF#1: Fugitive Dust Emissions:** The contractor would employ several control measures to minimize and control fugitive dust emissions and prepare a fugitive dust control plan for each distinct construction segment.
- **AQ-IAMF#2: Selection of Coatings:** The contractor would use lower VOC content paint than that required by SCAQMD Rule 1113.
- **AQ-IAMF#3: Renewable Diesel:** The contractor would use renewable diesel fuel to minimize and control exhaust emissions from all heavy-duty diesel-fueled construction diesel equipment and on-road diesel trucks.
- **AQ-IAMF#4: Reduce Criteria Exhaust Emissions from Construction Equipment:** All heavy-duty off-road construction diesel equipment used during the construction phase would meet Tier 4 engine requirements.
- **AQ-IAMF#5: Reduce Criteria Exhaust Emissions from On-Road Construction Equipment:** All on-road trucks would consist of model year 2010 or newer.

- AQ-IAMF#6: Reduce the Potential Impact of Concrete Batch Plants:** The contractor would prepare a technical memorandum documenting the concrete batch plant siting criteria, including locating the plant at least 1,000 feet from sensitive receptors, and utilization of typical control measures.

These IAMFs have helped to reduce the construction emissions generated by the project. For example, Figure 1 highlights the significant criteria pollutant emission reductions demonstrated by the project due to the IAMF#4.

Figure 1 - Emission Savings due to Tier 4 Equipment in 2020



Future Emissions Estimates

Since funding has not been fully secured for this project section, construction emissions would be re-visited and re-calculated after funding is secured, prior to the implementation of any offset programs. As such, the following steps will be followed to demonstrate conformity:

- Once construction funding is secured for the project section, a revised construction schedule will be developed.
- Based on the new schedule, a construction plan will be developed and analyzed to determine the emission burdens generated by construction.
- At the time of analysis, the IAMFs and MMs will be revisited and updated to include technologies and methodologies that were not considered in the earlier analysis. This review and implementation of updated measures will aid the project in reducing the generation of emissions due to construction.

- Once emission estimates are calculated using the revised IAMF and MMs, it will be determined if the estimates are still above the applicable General Conformity *de minimis* thresholds.
- All affected air districts will be notified of the emission levels and consulted to offset emissions for those years/pollutants that exceed General Conformity *de minimis* thresholds. Alternatively, the air districts could include these emissions in the applicable State Implementation Plan (SIP).
- The emission accounting program the Authority uses to track emissions for the segments currently being constructed will be utilized to actively quantify the construction emissions generated by the project.

Conclusion

As such, by signing this letter, the Authority and the air districts commit to the following:

- The Authority will work with each air district in order to ensure that the lowest level of construction emissions are generated through the use of mitigation measures outlined in this document and rolling review of best available technologies.
- Any emissions exceeding General Conformity *de minimis* thresholds will be completely mitigated, in the year of occurrence, through either existing offset programs or inclusion in the applicable SIP. The current emission offset programs include:
 - Emission Banking Certificate Program (EBCP) with the Eastern Kern Air Pollution Control District (EKAPCD). The EBCP facilitates the use of emission reductions by industry as tradeoffs or offsets for new or modified stationary sources of air contaminants, including transfer of ownership of such credits (http://www.kernair.org/Rule%20Book/2%20Permits/210_3%20Emissions%20Reductions%20Banking.pdf).
- In addition to the above, and as discussed with EKAPCD, there is also an option for those air districts to utilize offsets obtained through the SJVAPCD's Voluntary Emission Reduction Agreement (VERA) program.
- The Authority and the air district will enter into a contractual agreement to mitigate the project's emissions, as required by General Conformity regulations, by providing funds for the applicable offset program to fund grants for projects that achieve the necessary emission reductions.
- The air district will seek and implement the necessary emission reduction measures, using Authority funds; and
- The air district will serve in the role of administrator of the emissions reduction projects and verifier of the successful mitigation effort.

As such, General Conformity will be satisfied for this project section.



Glen Stephens, EKAPCD