West Stanislaus County

Community Air Monitoring Plan

California Statewide Mobile Monitoring Initiative (SMMI)

July 2025

Prepared by Aclima, Inc.

in partnership with Valley Improvement Projects and the SMMI Project Expert Group

Cap and Trade Dollars at Work

CALIFORNIA AIR RESOURCES BOARD

The Statewide Mobile Monitoring Initiative is part of California Climate Investments, a statewide initiative that puts billions of Cap-and-Trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment — particularly in disadvantaged communities.

Summary

This Community Air Monitoring Plan is prepared under the Statewide Mobile Monitoring Initiative (SMMI), a California Air Resources Board project. The SMMI is a statewide effort to use mobile monitoring methods to gather a comprehensive dataset of criteria pollutants, toxic air contaminants, and greenhouse gasses. The SMMI is part of California Climate Investments and aims to reduce greenhouse gas emissions and improve public health, particularly in disadvantaged communities. Aclima, Inc., a California Public Benefit Corporation focused on air monitoring technology, was contracted by the California Air Resources Board to develop and implement Community Air Monitoring Plans using mobile monitoring in 64 Consistently Nominated Communities (CNCs), which have been nominated for the community air protection program, but have not been selected for participation. Resources are needed to address air pollution in these communities.

The primary purpose of the SMMI is to provide better understanding of air pollution in 64 CNCs through mobile monitoring following a rigorously developed community air monitoring plan based on effective and inclusive community engagement.

The purpose of this Community Air Monitoring Plan (CAMP) is to outline the mobile air monitoring that will be conducted in response to air quality issues identified by community outreach in West Stanislaus County and inform future plans and community actions. This CAMP will outline monitoring objectives that reflect resident concerns about where and what pollution is most impactful. Community voices directed where mobile air monitoring will take place, the monitoring objectives, and where focused pollution studies are needed. This project also seeks to ensure that data is shared in an accessible way with all interested parties, including community members, to support the planning and implementation of emissions reduction actions. Data will be presented in digital format, in physical printout form, and verbally in public webinars.

Contents

Summary 3
List of Abbreviations Used in the Community Air Monitoring Plan 6
What is the reason for conducting air monitoring? 8
1. Community partnership approach 8
1.1 Project Team Roles and Responsibilities for Community Partnerships 8
1.2 SMMI resources 10
1.2.1 Engagement tools 10
1.3 Statewide community meetings 10
1.4 Engagement during and after monitoring 11
2. State the community-specific purpose for air monitoring 11
2.1 West Stanislaus County community profile 12
2.2 West Stanislaus County community-specific motivations for air monitoring 13
2.3 Gaps in air quality information that SMMI will address 21
3. Scope of actions 22
4. Air monitoring objectives 22
4.1 Define objectives 22
4.2 Define mobile monitoring methods to support objectives 23
4.3 Community-defined concerns, objectives, and analysis plans 26
5. Project roles and responsibilities 27
How will monitoring be conducted? 31
6. Data quality objectives 31
7. Monitoring methods and equipment 32
7.1 Monitoring equipment 33
7.2 Monitoring methods - broad area monitoring 34
7.3 Monitoring methods - targeted area monitoring 35
7.4 Strengths and limitations of mobile monitoring 35
8. Monitoring Areas 36
8.1 Community Mileage Allocation 36
8.2 Broad Area Monitoring Coverage 38
8.3 Targeted Area Monitoring 43
9. Quality control procedures 45
9.1 Aclima's Quality Assurance and Quality Control Procedures 45
9.2 Partner Mobile Laboratories Quality Assurance and Quality Control Procedures 47
10. Data management 48
10.1 Data categories and levels 48
10.2 Data management pipeline 49
10.3 Data review and quality assurance 50

10.4 Data transfer 50
10.5 Data visualization 50
11. Work plan for conducting field measurements 50
11.1 Broad area monitoring 51
11.1.1 Field materials and procedures 51
11.1.2 Communication and coordination 51
11.1.3 Timeline: duration, frequency, milestones, and deadlines 51
11.2 Targeted area monitoring 51
11.2.1 Field materials and procedures 51
11.2.2 Field communication and coordination 52
11.2.3 Timeline: duration, frequency, milestones, and deadlines 52
How will data be used to take action? 53
12. Evaluating effectiveness 53
12.1 Evaluating effectiveness during the monitoring period: 53
12.2 Evaluating effectiveness at the end of the Monitoring Period: 54
12.3 End of monitoring 55
13. Data analysis and interpretation 56
13.1 Preparation of finalized datasets 56
13.2 Aclima analysis, interpretation, and visualization of data 56
14. Communication of results to support action 60
14.1 Reporting of high concentrations prior to the end of the contract 60
14.2 Public Data Access 61
14.3 Community Story Maps 62
14.4 Final Report 62
Appendices 64

List of Abbreviations Used in the Community Air Monitoring Plan

Abbreviations	Term
AMN	Aclima Mobile Node
AMPs	Aclima Mobile Platforms
AQS	Air Quality System
BC	Black Carbon
C2H6	Ethane
CAMP	Community Air Monitoring Plan
CARB	California Air Resources Board
CBOs	Community-Based Organizations
CES	CalEnviroScreen
CH4	Methane
CNC	Consistently Nominated Community
CO	Carbon Monoxide
CO2	Carbon Dioxide
EPA	Environmental Protection Agency
GHGs	Greenhouse Gases
L0	Level 0
L1	Level 1
L2a	Level 2a
L2b	Level 2b
L3	Level 3
L4	Level 4
NO	Nitric Oxide
NO2	Nitrogen Dioxide

O3	Ozone
PEG	Project Expert Group
PEL	Permissible Exposure Limit
PI	Principal Investigator
PM2.5	Fine Particulate Matter
PML	Partner Mobile Laboratory
QA	Quality Assurance
QC	Quality Control
REL	Recommended Exposure Limit
RFP	Request for Proposal
SMMI	Statewide Mobile Monitoring Initiative
TVOC	Total Volatile Organic Compounds
VIP	Valley Improvement Projects
CCAC	Central California Asthma Collaborative

What is the reason for conducting air monitoring?

1. Community partnership approach

The Statewide Mobile Monitoring Initiative (SMMI) prioritizes forming strong community partnerships from the outset to guide the development of Community Air Monitoring Plans (CAMPs).

The SMMI Community Engagement Plan (Appendix A) is central to the success of the SMMI, emphasizing that communities must have a leading role in design, engagement, and implementation for the initiative to be successful. Aclima has implemented a co-leadership model with existing community experts and co-ownership with communities. This model is informed by CARB's Community Engagement Model, the People's Blueprint, CARB's Blueprint 2.0, and Facilitating Power's Spectrum of Community Engagement to Ownership. The goals of the community partnership approach include:

1. Develop and implement CAMPs that are responsive to the air quality concerns and needs of community members in pollution-overburdened areas.
2. Define monitoring objectives that reflect resident concerns about where and what pollution is most impactful. Community voices will direct where mobile air monitoring takes place, the monitoring objectives, and where focused pollution studies are needed.
3. Build community capacity to interpret mobile air quality data and help translate data into actions for emissions reduction and public health improvement.
4. Ensure that data is shared in an accessible way with all interested parties, including community members, to support the planning and implementation of emissions reduction actions.

Several groups play integral roles in the implementation and success of the SMMI. The SMMI Project Expert Group (PEG) includes community members, representatives from local air districts, community-based organizations (CBOs), and academia. Over 50 percent of the PEG comprises community members or representatives of CBOs. Engagement Leads, who are trusted community organizations, are subcontracted to lead and facilitate community engagement in the 64 Consistently Nominated Communities (CNCs). These Engagement Leads work closely with Aclima and the PEG to ensure CAMPs are responsive to community needs and that engagement is culturally and linguistically relevant. The California Air Resources Board (CARB) funds and oversees the SMMI. Aclima, as the contracted air monitoring technology company, is responsible for conducting community engagement and mobile monitoring. The project aims for a collaborative process where community members actively contribute to defining air monitoring objectives and the scope of actions.

1.1 Project Team Roles and Responsibilities for Community Partnerships

The core project team is made up of paid staff at a number of different organizations. These are described in Table 1. Additional project roles and responsibilities are outlined in Section 5.

Engagement Leads: Aclima has subcontracted with trusted community-based organizations or leaders to lead and co-manage community engagement efforts in the designated communities. These Engagement Leads are responsible for designing and implementing engagement strategies, conducting outreach, and working with Aclima to translate community knowledge (e.g., air pollution concerns) into responsive CAMPs. Some organizations may cover more than one community. Engagement Leads distribute an air pollution concerns survey and lead and conduct outreach for two community meetings, which serve as forums for community members and other interested parties to discuss local air pollution concerns and define where they would like air quality monitoring to occur. The Engagement Lead is also responsible for summarizing these meetings for Aclima, who then integrates community concerns into the CAMP. Engagement Leads serve as a conduit between community members and Aclima and CARB, helping to raise community questions and concerns and communicating project updates to the community.

Project Expert Group (PEG): A cross-sector group of representatives from local air districts, community-based organizations, academia, and residents from overburdened communities that guides community engagement and decision-making for this project. Over 50 percent of the Project Expert Group is composed of community members or representatives of community based organizations. The PEG serves as a trusted group of experts to help define and steer the initiative and ensure it meets community needs. PEG members are responsible for attending eight meetings during the project period, and completing six assignments that help inform and steer the project. Specifically, PEG members helped shape the content of the Community Engagement Plan, served on the selection committee for Engagement Leads, and shaped the methodology for allocating monitoring miles to each project community. Outside of meetings and assignments, Aclima requests that PEG members support decision-making in areas relevant to their professional and lived experiences.

Aclima's Project Team: Aclima monitors local engagement strategies and supports Engagement Leads by offering technical expertise, data interpretation, outreach materials, and meeting support. Aclima is responsible for organizing and facilitating all PEG meetings and managing PEG assignments.

Table 1: Project teams and contact details

Organization/team	Contact details	Type of Support Offered
CARB	smmi@arb.ca.gov	All project questions after the project has completed (May 2025)
Aclima	carb-team@aclima.earth	Monitoring updates and CAMP questions during the project period (through May 2025)
Project Expert Group	carb-team@aclima.earth	Questions about community engagement framework and statewide engagement opportunities during the project period (through May 2025)
Valley Improvement Projects (Engagement Lead)	info@vip209.org	Community engagement questions during the project period (through May 2025)

1.2 SMMI resources

The CARB SMMI website (https://ww2.arb.ca.gov/statewide-mobile-monitoring-initiative) details the objectives of the SMMI; the size and recipient of the contract award and collaborations with research institutions. Additionally the website outlines community engagement efforts, public participation opportunities, and the development of air monitoring plans. The website provides access to summary documents including the original CARB Request for Proposal (RFP), a project summary one-pager, FAQs, and Aclima's technical proposal.

The Aclima SMMI website (https://aclima.earth/ca-smmi) provides an overview of the SMMI. It explains the community engagement approach, project scope, monitoring technology and approach, and data availability. The website also provides access to the joint Aclima-CARB press release.

1.2.1 Engagement tools

The online and offline tools used to support community engagement as part of CAMP development include:

Online

- Aclima Project Website: For updates, resources, and contact information.
- Air Pollution Concern GeoSurvey: Online survey to gather community input on air quality concerns.
- Broad Area Monitoring Selection tool for community members to select the boundaries for broad area monitoring given allocated driving resources for each community
- Social Media Graphics: Customizable graphics and text for outreach efforts.
- Meeting Summary Report: Document template for documenting meeting content.

Offline

- Physical Flyers: Customizable flyers for distribution at community hubs.
- Community Air Monitoring Plan Development Handout: Infographic detailing the Community Air Monitoring Plan development process.
- Door-to-door outreach (in some communities)
- Phone call/text message outreach (in some communities)
- Radio announcements and/or project interviews (in some communities)

1.3 Statewide community meetings

The Community Engagement Plan includes the following statewide community meetings:

- **Pre-meeting / Introduction to project**: An online meeting introducing the project and answering questions, held at the air district level.
- **Meeting 1 / First Draft Community Air Monitoring Plan Boundary**: A hybrid (in person and online) meeting to identify community air quality concerns, monitoring objectives, monitoring areas, and community roles in the project.
- **Meeting 2 / Affirming Community Air Monitoring Plan**: A hybrid (in person and online) meeting to confirm monitoring areas and review draft Community Air Monitoring Plan(s).

- **Meeting 3 (series) / Project Results**: A series of online meetings, organized geographically by air district (or at a sub-district level if necessary), to explain project results, answer questions, and discuss next steps.

1.4 Engagement during and after monitoring

There will continue to be opportunities for the public to engage with the SMMI throughout monitoring and after completion of monitoring.

During the monitoring period:

- Project website: use the project website to access updates, resources, and contact information
- Webinars and training: participate in online sessions about data literacy, interpretation, emissions reduction success stories, and air management policies/regulations
- Community-specific project pages (via project website): Find updates, contact information, and leave comments/feedback for each Consistently Nominated Community on the project website
- Continued communication: receive email updates on monitoring progress (if contact information was provided during the engagement process).
- Office hours: Attend online office hours to ask project-related questions of the Aclima team

After the monitoring period:

- Publicly available data hosted by CARB
- StoryMaps: Explore interactive data visualizations for each Consistently Nominated Community
- Project Results meeting: Attend online meetings to learn about project results, ask questions, share experiences, and discuss next steps. These meetings will be held in English with Spanish interpretation and designated Spanish breakout rooms.
- Post-Meeting Survey: Provide anonymous feedback on the project and engagement process after the Project Results Meetings.

2. State the community-specific purpose for air monitoring

The primary purpose of the SMMI is to develop and implement Community Air Monitoring Plans that are responsive to the air quality concerns of community members and other stakeholders in the 64 CNCs. These communities have been consistently nominated by air districts, CBOs, and community members as needing extra attention to address high levels of air pollution.

Community air monitoring generally falls into to two types of air pollution concerns:

1. Ambient air quality monitoring - measure the levels of relevant air pollutants to understand which areas of the community are experiencing **disproportionate or unequal impacts** from air pollution as well as evaluate measured concentrations against existing standards and historical information.
2. Stationary source monitoring - measuring air pollutants near **specific stationary emission sources** (e.g. industrial facilities) so the emissions from the source can be characterized and the impact of the emissions on the local community can be assessed.

This air monitoring plan will address these monitoring aims - to identify and characterize areas experiencing disproportionate air pollution impacts and specific air pollutant emission sources - by focusing on specific sources and air pollution concerns identified by the community. Residents and other interested parties' knowledge were solicited through community meetings and surveys to understand the community's pollution burdens. A specifically designed Air Pollution Concerns Survey was used to help identify priority air pollution concerns in each community and collect detailed information to guide monitoring objectives. The CAMPs will define where mobile air monitoring takes place, what the monitoring objectives are, and where focused pollution studies are needed, all directed by community voices.

2.1 West Stanislaus County community profile

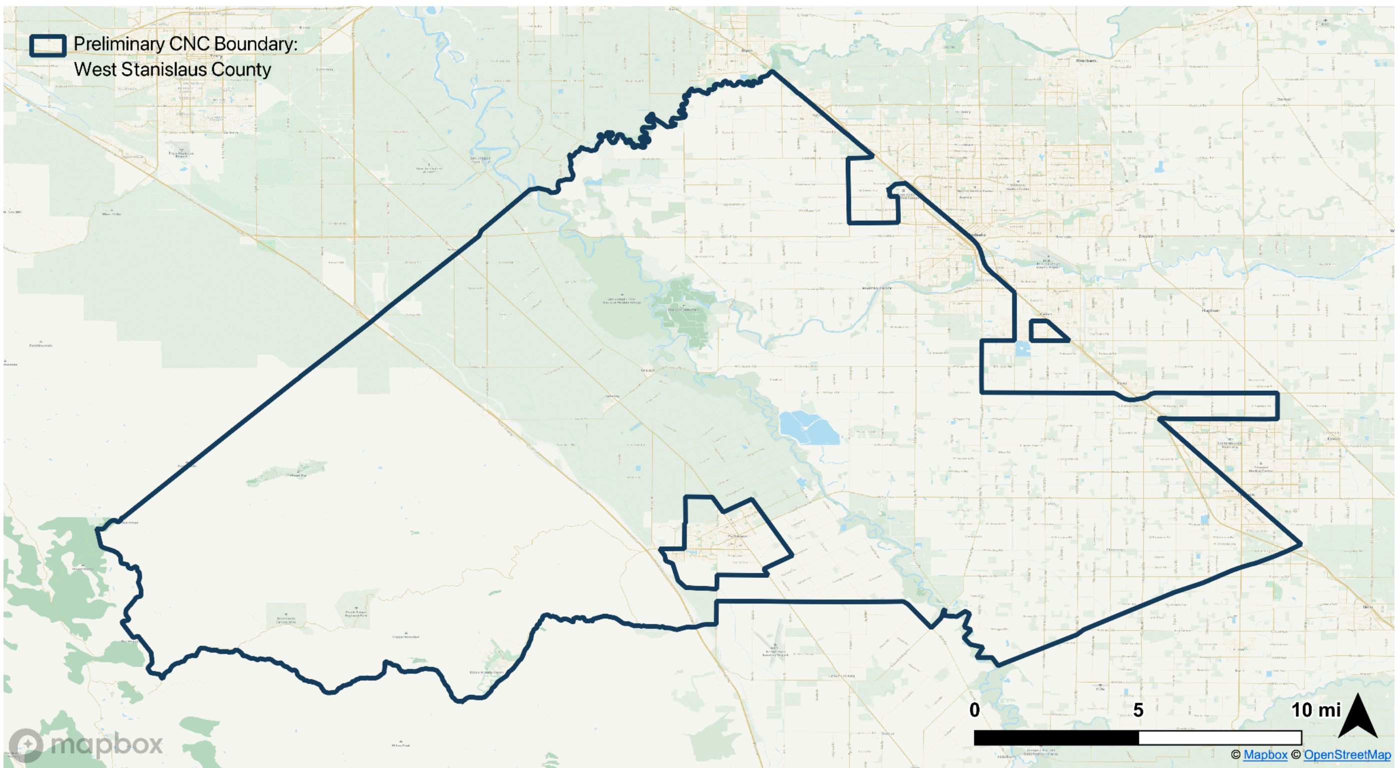

Figure 1: West Stanislaus County Preliminary CNC boundary: Stanislaus County census tracts west of Highway 99, with CES 4.0 scores in the top 25th percentile.

West Stanislaus County is located in the San Joaquin Valley in Central California. The region is largely rural, with an economy largely made up of agricultural activities. The two primary freeways in the San Joaquin Valley, I-5 and State Route 99 pass roughly along the east and west boundaries of the community, with most of the larger population centers located along SR-99.

West Stanislaus County is composed of diverse communities, each with its own distinct demographic profile. The City of Turlock, with a population of 72,740, has a median household income of approximately $81,595, and 9.6% of its residents live below the poverty line. The age distribution shows a significant portion under 18 (24.6%) and between 18-64 (59.6%). Racially and ethnically, Turlock is diverse with 41.2% identifying as Hispanic or Latino and 44.3% as White, along with notable Asian (7.3%) and two or more races (4.0%) populations. In terms of education, 26.4% have a high school diploma or equivalent, while 14.8% hold a bachelor's degree and 11.4% have a graduate or professional degree. English is the primary language spoken by 55.4% of residents, but a substantial 27.9% speak Spanish.

In contrast, the Town of Grayson is much smaller with 1,041 residents and a slightly higher median household income of around $87,961, though 12.0% live below the poverty line. The age distribution is 21.6% under 18 and 67.0% between 19-64. Grayson has a predominantly Hispanic or Latino population at 89.1%, with only 6.8% identifying as White. Educational attainment levels are lower than Turlock, with 33.1% having a high school diploma and only 6.6% holding a bachelor's degree. Spanish is the dominant language, spoken by 77.3% of residents, while only 21.1% speak English only.

The Town of Westley has a population of 575 and a lower median household income of approximately $45,833, with a higher poverty rate of 18.6%. A significant 51.7% of the population is under 18, and only 2.5% are 65 and over. Westley is overwhelmingly Hispanic or Latino (94.2%). Educational attainment is also lower, with 26.4% having a high school diploma and no residents holding a bachelor's or graduate degree. Spanish is spoken by 100% of the residents.

The City of Patterson has a population of 23,781 and a higher median household income of around $93,542, with 8.5% of residents living below the poverty line. The age distribution shows 32.1% under 18 and 58.8% between 18-64. Patterson has a majority Hispanic or Latino population (63.0%), followed by White alone (18.8%) and notable Black or African American (6.6%) and Asian (6.2%) populations. Educational attainment shows 32.1% with a high school diploma and 10.5% with a bachelor's degree. While 43.9% speak English only, 48.7% speak Spanish.

Stanislaus County, which includes West Stanislaus County, faces significant challenges due to poor air quality. The region consistently receives failing grades from the American Lung Association for ozone and particulate matter pollution, leading to numerous unhealthy air quality days. Consequently, negative public health outcomes such as asthma, cardiovascular disease, low birth weight, and toxic responses associated with pesticide contamination are prevalent. Asthma is particularly widespread, with a CalEnviroScreen 4.0 indicator in the 79th percentile for asthma incidence in the monitoring region, affecting approximately 35,728 adults and 7,433 children in Stanislaus County. The county's asthma-related emergency room visits surpass the state average. Climate change further exacerbates asthma symptoms due to increased heat and wildfire smoke. Cardiovascular health is also a concern, with exposure to pollutants like $PM_{2.5}$ and ozone linked to higher rates of heart disease. The CalEnviroScreen 4.0 indicator for cardiovascular disease in the 75 percentile for the monitoring region. Vulnerable populations, including older adults and socioeconomically disadvantaged individuals, face increased risks.

2.2 West Stanislaus County community-specific motivations for air monitoring

Community-identified air pollution concerns

To identify the community-specific motivations for air monitoring in West Stanislaus County, Aclima worked with Valley Improvement Projects to gather air quality and emission source concerns directly from the community. An SMMI Air Pollution Concerns survey was circulated by email, distributed in person community meetings, and made available during other events in the community. In addition, Valley Improvement Projects collected air pollution concerns voiced during community meetings in support of the SMMI effort.

In West Stanislaus County, several known pollution sources contribute to air quality issues. Dairies and poultry farms (like Foster Farms) release ammonia and particulate matter, which can worsen respiratory conditions like asthma and contribute to fine particulate matter ($PM_{2.5}$). The Turlock Transfer Station, Turlock Wastewater Treatment, the

Patterson Wastewater Treatment Center, and the Fink Road Landfills emit methane and other volatile organic compounds (VOCs), potentially leading to ground-level ozone and respiratory health risks. The Union Pacific Railroad, with its diesel-powered locomotives, releases nitrogen oxides and particulate matter, impacting nearby residents. Lastly, transportation, including commuter vehicles, commercial freight, and emissions from nearby warehouses in Patterson and Turlock, contributes to elevated levels of particulate matter (PM) and nitrogen oxides (NO_x), linked to respiratory and cardiovascular diseases. Additionally, Stanislaus County ranks 8th in California for pesticide use, with substances like 1,3-dichloropropene (Telone) and glyphosate being prevalent and raising concerns about cancer, reproductive harm, and neurotoxicity, especially near schools and homes.

Other specific concerns identified through community engagement are included in the table below. These concerns were compiled from community members during community meetings as well as through the SMMI Air Pollution Concerns Survey.

Table 2: Specific concerns identified through community engagement

Location and Concern	Details
G & V Trucking - on Hito drive	pollution from trucks releasing nitrogen oxides (NOx), particulate matter (PM), carbon monoxide (CO), hydrocarbons, and carbon dioxide (CO2),
gasoline / convenience store next to the United Community Center	emissions of volatile organic compounds (VOCs) and benzene from the gas station
nearby agriculture fields along River Road and Grayson Road	Pesticides from nearby farms are a major concern. One mother shared her daughter's frequent complaints about a persistent smell near an elementary school close to agricultural fields, which she believed was due to pesticide spraying. When pesticides are sprayed, the smell is extremely foul. Dust can become a significant problem during the agricultural harvest season, especially in crops like almonds, which are harvested from July to October.
Traffic congestion in school areas (North 7th Street and West Las Palmas, M Street and Ward Avenue, and American Eagle Ave and Shearwater Dr)	Key school areas with significant traffic congestion in the mornings and afternoons.
Highway 33 and Sperry Avenue	There is major truck traffic along Highway 33 and Sperry Avenue. Trucks release nitrogen oxides (NOx), particulate matter (PM), carbon monoxide (CO), hydrocarbons, and carbon dioxide (CO2).
City of Patterson Wastewater Facility and surrounding canals, particularly near Juarez Court and 1st Street	Public facilities of concern for monitoring include the City of Patterson Wastewater Facility and the surrounding canals, particularly near Juarez Court and 1st Street.
Stanislaus County landfill	The Stanislaus County landfill was also mentioned as a public facility of concern.
Industries located along 3rd and M Streets, North 1st Street, Park Center Drive, and Keystone Pacific Parkway	Specific concerns were also raised about industries located along 3rd and M Streets, North 1st Street, Park Center Drive, and Keystone Pacific Parkway.

Largo Concrete Inc. on North 1st Street	Some specific businesses were mentioned, including Largo Concrete Inc. on North 1st Street.
Traina Home Grown on North 1st Street	Some specific businesses were mentioned, including Traina Home Grown on North 1st Street.
West Main Street, South Tegner Road, W. Linwood Avenue (West of the 99) to North Soderquist, Lander Avenue and West F. Street (East of the 99)	Community members in Turlock expressed interest in monitoring these areas.
Key schools west of the 99 (Roselawn High School, Chatom Elementary School)	Key schools in the outer limits of the City of Turlock (west of the 99).
City of Turlock Transfer Station	Key public facilities to monitor include the City of Turlock Transfer Station. Likely to contribute to particulate matter, chemical emissions, and foul odors.
Wastewater Facility	Key public facilities to monitor include the Wastewater Facility. Likely to contribute to particulate matter, chemical emissions, and foul odors.
Nearby agriculture fields	Nearby agricultural fields. Likely to contribute to pesticide drift. Pesticide use and dust are common during almond harvest (July-October).
Dairies	Dairies. Likely to contribute to chemical emissions and foul odors.
The railroad	The railroad. Likely to contribute to particulate matter and chemical emissions.
Foster Farms	Specific concerns were raised about Foster Farms. Likely to contribute to foul odors.
Amazon Distribution Center	Specific concerns were raised about the Amazon Distribution Center. Likely to contribute to nitrogen oxides (NOx) and volatile organic compounds (VOCs) from truck traffic.
East Las Palmas to American Eagle Avenue, Ward Avenue, and Highway 33	Community members in Patterson expressed interest in monitoring these areas.
Area crossing the railroad tracks from East Las Palmas to North Hartley Street, Walnut Avenue, and North 1st Street	This area adjacent to the railroad tracks was also identified for monitoring.
Wastewater treatment plant	No additional details provided.
Distribution or last mile warehouse	No additional details provided.
Farm / Animal feedlot	Concerns include cow compost used as fertilizer and area contaminants without purifiers.
Gas station	No additional details provided.
Other / Unknown / Unspecified source types	Concerns include a specific address ("223 N 5 Patterson ca") , mention of being near a home ("Casa") , low-cost humidifiers and air purifiers , semi truck parking near a community park , and mention of pesticides and fertilizers .
Roadway	Concern about schools and children related to the roadway.

Pesticide concerns	Concerns about pesticides being used in the area , including responses related to whether DCP is used (indicated as "Yes" or "I don't know") ....

Top pollution sources identified via emission inventories

Aclima scientists gathered important sources from available emission inventories, focusing on major polluting facilities and AB2588 Air Toxics Hot Spots. Known pollution sources within West Stanislaus County are listed in Tables 3 and 4. Table 3 lists the top 10 AB2588 Air Toxics Hot Spots facilities within or near the West Stanislaus County monitoring area, ranked by total toxicity-weighted emissions. For each facility, it provides the name, longitude, latitude, a general description of its industry or service, and a comprehensive list of the specific pollutants it reportedly emits. Table 4 identifies major polluting facilities located within or near the West Stanislaus County monitoring boundary. This table includes the facility name, its longitude and latitude, a description of its primary operation (e.g., Electricity Generation, Other Combustion Source), and a list of the key pollutants it reports.

Facilities such as Gallo Glass Company, Covanta Stanislaus Inc., and California Dairies Inc.–Turlock North report emissions of a wide range of hazardous pollutants, including diesel particulate matter (Diesel PM), formaldehyde, benzene, hexavalent chromium, and various polycyclic aromatic hydrocarbons (PAHs). These emissions stem from industrial activities such as glass production, energy generation, waste processing, and agricultural services. Common pollutants from these facilities include diesel PM, formaldehyde, $PM_{2.5}$, NO_X, SO_X, methane (CH_4), and other combustion byproducts, suggesting significant contributions to both air toxics and criteria pollutant burdens.

These tables serve to highlight significant sources of air pollution identified through emission inventories, complementing the community-identified concerns by providing specific data on industrial and commercial facilities that may contribute to air quality challenges in the region.

Table 3: Top 10 AB2588 toxics hotspots located within or near the monitoring area boundary for West Stanislaus County, as defined by the total toxicity-weighted emissions (TWE) for chronic, cancer causing, and acute categories combined.

Facility Name	Longitude	Latitude	Description	Reported Pollutants
GALLO GLASS COMPANY	-120.9748	37.6307	GLASS CONTAINERS/STONE,CLAY,AND GLASS PRODUCTS/GLASS,PRESSED OR BLOWN/GLASS CONTAINERS	Acetaldehyde, Arsenic, Ethyl benzene, Naphthalene, Cobalt, PAHs, total, w/o individ. components reported [Treated as B(a)P for HRA], Hexane {n-Hexane}, Diesel engine exhaust, particulate matter (Diesel PM), Selenium, Acrolein, Manganese, Benzene, Xylenes (mixed), Propylene, Beryllium, Lead, Toluene, Chromium, Formaldehyde, Copper, Cadmium, Silver, Chromium, hexavalent (& compounds), Mercury, Antimony, Vanadium (fume or dust), Barium, Nickel, Zinc, Thallium
HARRIS MORAN SEED COMPANY	-120.9127	37.6308	CROP PREPARATION SVCS FOR MKT/AGRICULTURAL SERVICES/CROP	Ammonia, Phosphine

			SERVICES/CROP PREP SERVICES FOR MARKET	
GILTON RESOURCE RECOVERY	-120.9276	37.6227	REFUSE SYSTEMS/ELECTRIC,GAS ,SANITARY SERVICES/SANITARY SERVICES/REFUSE SYSTEMS	Zinc, Arsenic, Chromium, Lead, Cadmium, Selenium, Chromium, hexavalent (& compounds), Manganese, Nickel, Diesel engine exhaust, particulate matter (Diesel PM), Mercury, Copper, Aluminum, Cobalt
GILTON RESOURCE RECOVERY	-120.9276	37.6227	FERTILIZERS, MIXING ONLY/CHEMICALS AND ALLIED PRODUCTS/AGRICULTU RAL CHEMICALS/FERTILIZER S,MIXING ONLY	Chromium, hexavalent (& compounds), Propylene, Manganese, Mercury, Cobalt, Lead, Zinc, Selenium, Nickel, Naphthalene, Acetaldehyde, Aluminum, Isopropyl alcohol, sec-Butyl alcohol, Chromium, Cadmium, Methanol, Arsenic, Ammonia, Copper
COVANTA STANISLAUS, INC (Note: This facility has reportedly closed as of 2024)	-121.1065	37.3916	REFUSE SYSTEMS/ELECTRIC,GAS ,SANITARY SERVICES/SANITARY SERVICES/REFUSE SYSTEMS	Benzo[k]fluoranthene, Benz[a]anthracene, Benzene, Lead, Nickel, Indeno[1,2,3-cd]pyrene, Chromium, Copper, Acenaphthylene {Cyclopenta[de]naphthalene}, Dibenz[a,h]anthracene, Beryllium, PCBs {Polychlorinated biphenyls}, Chromium, hexavalent (& compounds), Manganese, Arsenic, Benzo[g,h,i]perylene, Fluorene, Benzo[a]pyrene, Pyrene, Formaldehyde, Fluoranthene, 2-Methylnaphthalene, Cadmium, Hydrochloric acid, Antimony, Chrysene, Perylene, Benzo[b]fluoranthene, Benzo[e]pyrene, Zinc, Phenanthrene, Anthracene, Dibenzofurans (chlorinated) {PCDFs} [Treated as 2378TCDD for HRA], Ammonia, Hydrogen fluoride, Mercury, Naphthalene, Acenaphthene
CALIFORNIA DAIRIES INC -TURLOCK NORTH	-120.8966	37.4996	CONDENSED AND EVAPORATED MILK/FOOD AND KINDRED PRODUCTS/DAIRY PRODUCTS/CONDENSE D AND EVAPORATED MILK	Benzo[b]fluoranthene, Toluene, Acetaldehyde, Benzene, Ethylene dichloride {EDC}, 2-Methylnaphthalene, Carbon tetrachloride, Hexane {n-Hexane}, Ethyl chloride {Chloroethane}, Ethyl benzene, Naphthalene, Fluorene, Benzo[e]pyrene, 1,1,2,2-Tetrachloroethane, PAHs, total, w/o individ. components reported [Treated as B(a)P for HRA], Phenol, Chloroform, Formaldehyde, Acenaphthylene {Cyclopenta[de]naphthalene}, Benzo[g,h,i]perylene, Ethylene dibromide {EDB}, Vinyl chloride, Chrysene, Xylenes (mixed), 1,2,4-Trimethylbenzene, Propylene, Acrolein, 1,3-Dichloropropene, Methanol,

				1,2-Dichloropropane, 2,2,4-Trimethylpentane, Ammonia, 1,1,2-Trichloroethane, Styrene, Biphenyl, Isobutyraldehyde, 1,3-Butadiene, 1,1-Dichloroethane, Acenaphthene, Chlorobenzene, Fluoranthene, Methylene chloride {Dichloromethane}, Phenanthrene, Pyrene
CITY OF MODESTO, COMPOST FAC	-121.0024	37.6448	GENERAL GOVERNMENT, NEC/EXEC,LEGISLATIVE, GENERAL GOV./OTHER GENERAL GOVERNMENT/OTHER GENERAL GOVERNMENT	Diesel engine exhaust, particulate matter (Diesel PM)
CAL ALMOND HULLING & SHELLING (TY ANGLE)	-120.9089	37.4411	CROP PREPARATION SVCS FOR MKT/AGRICULTURAL SERVICES/CROP SERVICES/CROP PREP SERVICES FOR MARKET	Ammonia, Phosphine
COVANTA STANISLAUS, INC (Note: This facility has reportedly closed as of 2024)	-121.1065	37.3916	ELECTRIC & OTHER SERVICES COMB/ELECTRIC,GAS,SANITARY SERVICES/COMBO ELECTRIC,GAS,OTHER UTIL/ELECTRIC,OTHER SERVS COMBINED	Acrolein, Manganese, 1,3-Butadiene, PAHs, total, with individ. components also reported, Diesel engine exhaust, particulate matter (Diesel PM), Ethyl benzene, Toluene, Mercury, Chlorobenzene, Benzene, Lead, Hexane {n-Hexane}, Acetaldehyde, Arsenic, Propylene, Nickel, Xylenes (mixed), Naphthalene, Formaldehyde, Hydrochloric acid, Selenium, Chromium, hexavalent (& compounds), Cadmium, Phosphoric acid, Chromium, Copper, Zinc
WALNUT ENERGY CENTER AUTHORITY	-120.8954	37.4872	ELECTRIC SERVICES/ELECTRIC,GAS,SANITARY SERVICES/ELECTRICAL SERVICES/ELECTRIC SERVICES	Benzene, Xylenes (mixed), PAHs, total, with individ. components also reported, Sulfuric acid, 1,3-Butadiene, Ammonia, Naphthalene, Toluene, Formaldehyde, Sodium hydroxide, Ethyl benzene, Diesel engine exhaust, particulate matter (Diesel PM), Acrolein, Acetaldehyde, Propylene oxide, Chloroform

Table 4: Major polluting facilities located within the monitoring area boundary (up to 200 m outside the boundary).

Facility Name	Longitude	Latitude	Description	Reported Pollutants
Covanta - Stanislaus, Inc (Note: This facility has reportedly closed as of 2024)	-121.14	37.397	Electricity Generation	Diesel PM, 1,3-Butadiene, Formaldehyde, Benzene, CH4, Chromium Hexavalent, PM2_5, Nickel, NOx, PM10, Hydrochloric Acid, SOx, N2O
Gallo Glass Company	-120.979	37.629	Other Combustion Source	Diesel PM, Formaldehyde, Benzene, CH4, Chromium Hexavalent, PM2_5, Nickel, NOx, PM10, SOx, N2O
Frito Lay - Modesto	-120.919	37.631	Other Combustion Source	Formaldehyde, Benzene, CH4, PM2_5, NOx, PM10, SOx, N2O
California Dairies, Inc. Turlock	-120.887	37.49	Other Combustion Source	Diesel PM, Formaldehyde, Benzene, CH4, PM2_5, NOx, PM10, SOx, N2O
Stanislaus Food Products	-120.991	37.636	Other Combustion Source	CH4, PM2_5, NOx, PM10, SOx, N2O
Foster Dairy Farms DBA Crystal Creamery	-121.013	37.647	Other Combustion Source	Diesel PM, 1,3-Butadiene, Formaldehyde, Benzene, CH4, PM2_5, NOx, PM10, SOx, N2O
Darling Ingredients Inc - Turlock	-121.03	37.465	Other Combustion Source	Formaldehyde, Benzene, CH4, PM2_5, NOx, PM10, SOx, N2O
Aemetis Advanced Fuels Keyes, Inc.	-120.916	37.553	Other Combustion Source	Diesel PM, Formaldehyde, Benzene, CH4, PM2_5, Nickel, NOx, PM10, SOx, N2O
Valley Milk, LLC	-120.903	37.496	Other Combustion Source	CH4, PM2_5, NOx, PM10, SOx, N2O
Del Monte - Modesto	-120.918	37.636	Other Combustion Source	Formaldehyde, Benzene, CH4, PM2_5, NOx, PM10, SOx, N2O
SunOpta Aseptic	-120.935	37.634	Other Combustion Source	CH4, PM2_5, NOx, PM10, SOx, N2O
Hilmar Cheese, Inc. - Turlock Facility	-120.897	37.5	Other Combustion Source	CH4, PM2_5, NOx, PM10, SOx, N2O

Past and ongoing air quality measurements and studies

Three regulatory sites are contained within ten miles of West Stanislaus County's preliminary CNC boundary. Site 06-077-3005, The Tracy-Airport site (Site 06-077-3005) located at 5749 S. Tracy Blvd measures Nitric Oxide (NO), Nitrogen Dioxide (NO2), Oxides of Nitrogen (NOX), Ozone (O3), fine particulate (PM2.5), and coarse particulate matter (PM10). This site has been operating since 2006. Site 06-099-0005, The Modesto-14th Street site located at 814 14th Street (Site 06-099-0005) measures CO, O3, PM2.5, PM10, as well as various metals including Aluminum, Antimony, Barium, Chromium. This station also measures woodsmoke indicators galactosan, levoglucosan, and mannosan. The Modesto-14th Street site has been collecting data since 1981. The site in Turlock, located at 900 S. Minaret Ave (Site 06-099-0006), has been in operation since 1992 and measures NO, NO2, NOx, O3, PM2.5, and

PM10. These stations are operated by San Joaquin Valley Air Pollution Control District (Tracy-Airport and Turlock) or the California Air Resources Board (Modesto) and are part of the national regulatory network overseen by the USEPA in support of the federal clean air act. The measurements from the stations are intended to represent regional air quality and demonstrate compliance with regional air quality standards.

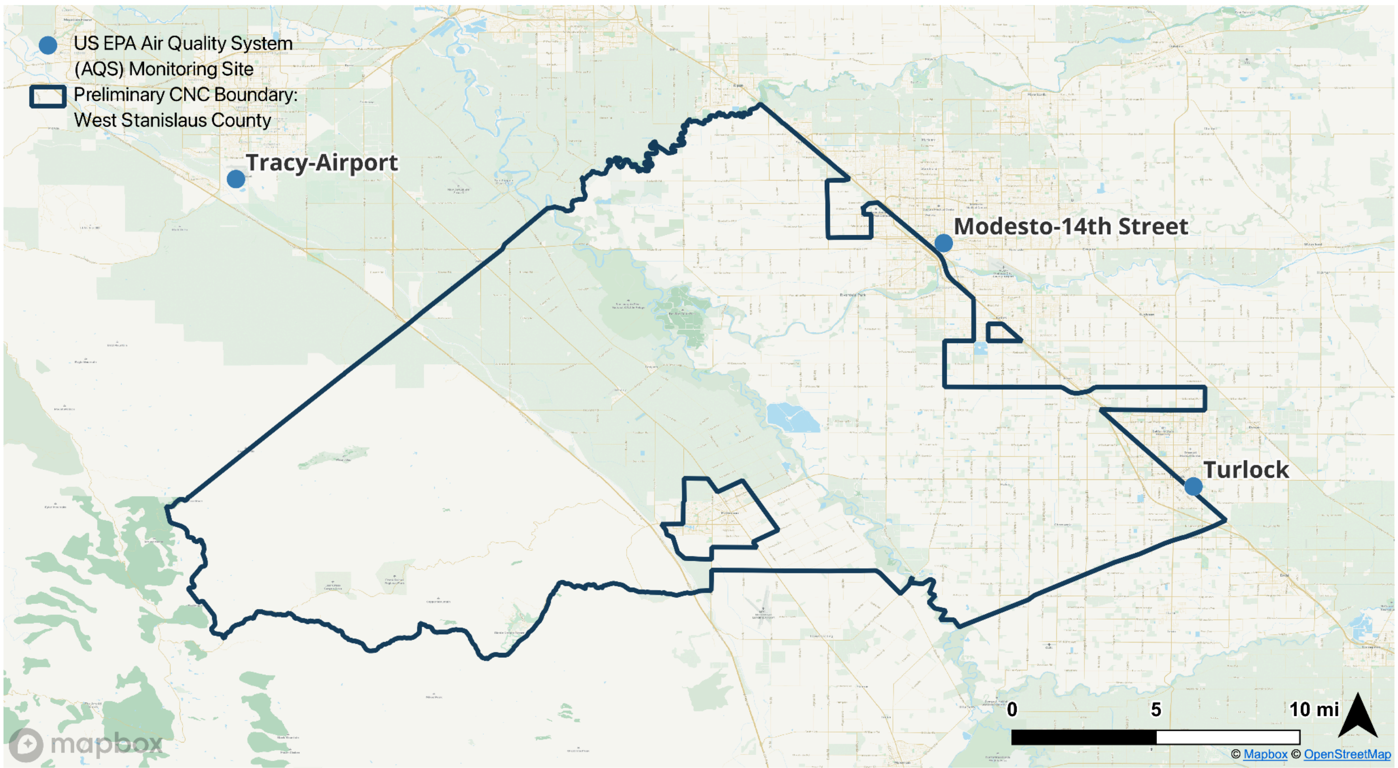

Figure 2: West Stanislaus County preliminary CNC boundary and local Air Quality System (AQS) monitoring sites.

There is a long history of air pollution research conducted in the San Joaquin Valley. Several large, multi-investigator projects have focused on understanding the factors that control pollution concentrations throughout the Valley, especially ozone and PM2.5. The USEPA funded a multi-year center at UC Davis, the San Joaquin Valley Aerosol Health Effects Center, with an aim to improve understanding of toxicity to humans of atmospheric aerosols. Other academic research projects have focused on emissions from dairy operations and similar agricultural activities. While these projects advance understanding of the air pollution in the region, they are not typically conducted at the community level. Some recent research projects have been looking at pesticides, including a multi-community air monitoring project in Stanislaus county conducted by the California Department of Pesticide Regulation to measure the level of pesticides 1,3-dichloropropene, chloropicrin, and methyl isothiocyanate in the air in Grayson and the Monterey Park tract. Measurements were conducted during winter and spring of 2024. Preliminary results showed detections of pesticides, but that all levels were below health thresholds.

Environmental justice advocacy is actively taking place in West Stanislaus County. The Valley Improvement Projects (VIP) Environmental Justice Task Force is a community-led initiative addressing environmental health issues in underserved areas, including air and water pollution, through education, policy advocacy, and engagement with agencies. VIP supports partners in the SJV Air Community Air Monitoring Network and is involved in the AB 617 Community Air Grant-funded Local Community Emissions Reduction Program (L-CERP), a resident-led effort focused on air monitoring and emissions reduction strategies in West Stanislaus County. VIP collaborates with the Central California Asthma Collaborative (CCAC) in the SJV Air App initiative to enhance access to real-time air quality data, with 12 air monitors currently active in the West Stanislaus County Communities.

Past emissions reduction projects include transportation improvements in Turlock and a solar thermal system at California Dairies in Turlock. Electric buses are also in use in West Modesto. A current project in progress is the Urban Bicycle Trail at Salado Creek in Patterson. These efforts, particularly those driven by community organizations like VIP, demonstrate a commitment to monitoring air quality, reducing emissions, and advocating for environmental justice in West Stanislaus County.

2.3 Gaps in air quality information that SMMI will address

The official regulatory air quality monitoring network, the three sites within 10 miles of West Stanislaus County, provide critical data for understanding regional air quality trends and compliance with state and federal standards. However, similar to other communities, these stations are insufficient for capturing localized air pollution patterns or near-source exposures in West Stanislaus County, where agricultural and industrial emissions interact with mobile sources to create complex air quality challenges. To address these gaps, the AB 617 Community Air Grant-supported Local Community Emissions Reduction Program (L-CERP), led by Valley Improvement Projects (VIP), has deployed a network of 12 community-based monitors and conducted focused community engagement to guide siting and strategy. This has provided more insight to the community but still lacks the spatial and temporal resolution of air pollution monitoring needed to address the numerous community concerns.

West Stanislaus County is a predominantly rural region in California's San Joaquin Valley, with a mixture of small towns and agricultural land. Community members have identified numerous pollution sources of concern, many of which intersect with environmental justice issues. Key concerns include:

- Air emissions from dairies and animal feed operations
- Pesticide drift from agricultural fields
- Mobile sources, including diesel trucks traveling on SR-99, I-5, and through local freight corridors
- Stationary industrial source and multiple food processing and waste facilities
- Landfills, wastewater treatment plants, and composting operations
- The Union Pacific railroad and nearby warehouses

To provide the type of data necessary to characterize the areas of concern identified by the community and prioritize locations for further plans and community action, the following data gaps were identified:

- Increased monitoring near sensitive receptors such as schools and senior housing in West Turlock, Patterson, and Grayson
- Speciated pollutant data to attribute emissions to agricultural vs. industrial vs. transportation sources
- Measurements that capture short-term peaks and community-reported hotspots

This plan proposes to use mobile air pollution monitoring to provide highly spatially resolved pollutant concentration data for the community. The detailed spatial information from mobile monitoring can help identify specific, localized sources of pollution and show how pollutant levels change across and between different neighborhoods. The Aclima Mobile Platform includes an expanded suite of pollutants that support improved characterization of sources including the use of black carbon to diesel particulate matter and TVOCs to indicate areas where toxic air contaminants may be located. Furthermore, the use of the expanded suite of equipment in the Partner Mobile Laboratories enables communities to be monitored for specific toxic air contaminants. The information gathered through mobile monitoring supports the development of pollution reduction plans that can be different for various parts of a community, allowing for solutions that are specifically suited to local needs.

3. Scope of actions

Data gathered by mobile air monitoring can support a wide range of actions by communities and governments to reduce emissions and/or exposure. Examples of possible actions include, but are not limited to:

- Regulatory investigation: where these data identify hotspots that can be statistically attributable to a given source, local and state agencies may decide to do further investigative work that can lead to compliance and enforcement actions (e.g. fines, new emissions control requirements)
- Traffic management strategies: by identifying hotspots caused by vehicular emissions, these data can inform local and state vehicular emissions control strategies, including initiatives like anti-idling enforcements or vehicle emissions inspection programs
- Urban planning: governments can use an understanding of how air quality varies over time and space to direct investment in green spaces or update zoning regulations to restrict certain land uses
- Corporate action: individual companies may be able to use these data to adjust their transportation routes and schedules, or facility operations, to reduce emissions and health impacts
- Modeling and forecasting: mobile air monitoring data can support improved modeling of historical air quality that allows better prediction of future patterns and impacts across a community
- Health risk assessments: where these data identify disproportionate impacts of pollution across the geography of a community, these insights can be used in conjunction with other datasets to assess potential health impacts for communities or identify locations where formal health risk assessments should be performed
- Community action: data provided by mobile air monitoring may be useful to community-based organizations in advocacy work to reduce emissions and/or exposure, including the development of Local Community Emissions Reduction Plans (LCERPs)

When monitoring has concluded, CARB, Air Districts, community groups, regulatory agencies, researchers, and other parties are encouraged to leverage the data to address specific air pollution concerns.

4. Air monitoring objectives

4.1 Define objectives

The air monitoring aims described in Section 2 can be expanded into two primary **air monitoring objectives**:

1. **Identification and characterization air pollutant emission sources**
   This objective seeks to better understand and characterize sources, which can include the following goals:
   - Identify where pollution is coming from
   - Identify key pollutants coming from a given source
   - Understand what locations in communities are impacted by pollution from a given source

- Understand how concentrations can vary directly downwind of a given source
- Understand how emissions from a given source may vary by time of day
- Understand how different sources contribute to a given pollutant in the community

2. **Identification disproportionate air pollution impacts**
   Mobile air monitoring can also be used to investigate various objectives focused on understanding the unequal distribution of air pollution within a community:
   - Identify the key pollutants that impact ambient air in a community
   - Understand the typical concentrations of pollutants in ambient air in the community
   - Understand how pollution is distributed across a community
   - Understand how pollution varies in time across a community

These two objectives support investigation of the majority of concerns identified by the community by either characterizing both individual sources, such as a wastewater treatment facility and an Amazon distribution center, and broader source types such as mobile sources and industrial corridors, as well as the impact of these sources across the community.

4.2 Define mobile monitoring methods to support objectives

Given the gaps identified in Section 2.3 and the community specific air quality concerns, the types of data needed include high spatial resolution data in a wide variety of locations across the community of West Stanislaus, in particular for blackcarbon, vocs, and specific air toxics. The mobile monitoring approach enables the collection of data at high spatial resolution throughout the community over the entire mapping period. This approach results in measurements of a snapshot of the concentration of air pollutants near to many if not most of the areas of concern identified by the community during the project. The data resulting from mobile monitoring support targeting a wide range of source types within the monitoring area, allowing for flexibility of source analysis without predetermined source selection.

The CAMP will use two mobile monitoring approaches to support project air monitoring objectives - broad area monitoring or targeted area monitoring. Broad area monitoring supports the air monitoring objectives throughout the entire CAMP monitoring areas over the entire monitoring time period while targeted area monitoring will focus on a subset of specific air pollution concerns with focused driving around those concerns for shorter periods of time.

Broad area monitoring: monitoring vehicles collect data within the entire CAMP monitoring area over an extended time period using the Aclima Mobile Platform. Vehicles monitor on publicly accessible roads, gathering repeat measurements at different times of day, days of the week, and seasons. Broad area monitoring tells us about the typical concentrations of pollutants and locations of persistently high pollutant concentrations throughout the CAMP area over the whole period of monitoring. As an example, Figure 3 shows results of a broad area monitoring approach in San Francisco, displaying typical NO2 concentrations observed over a 1 year time period. Broad area monitoring will occur over a 9 month time period between June 2025 and March 2026.

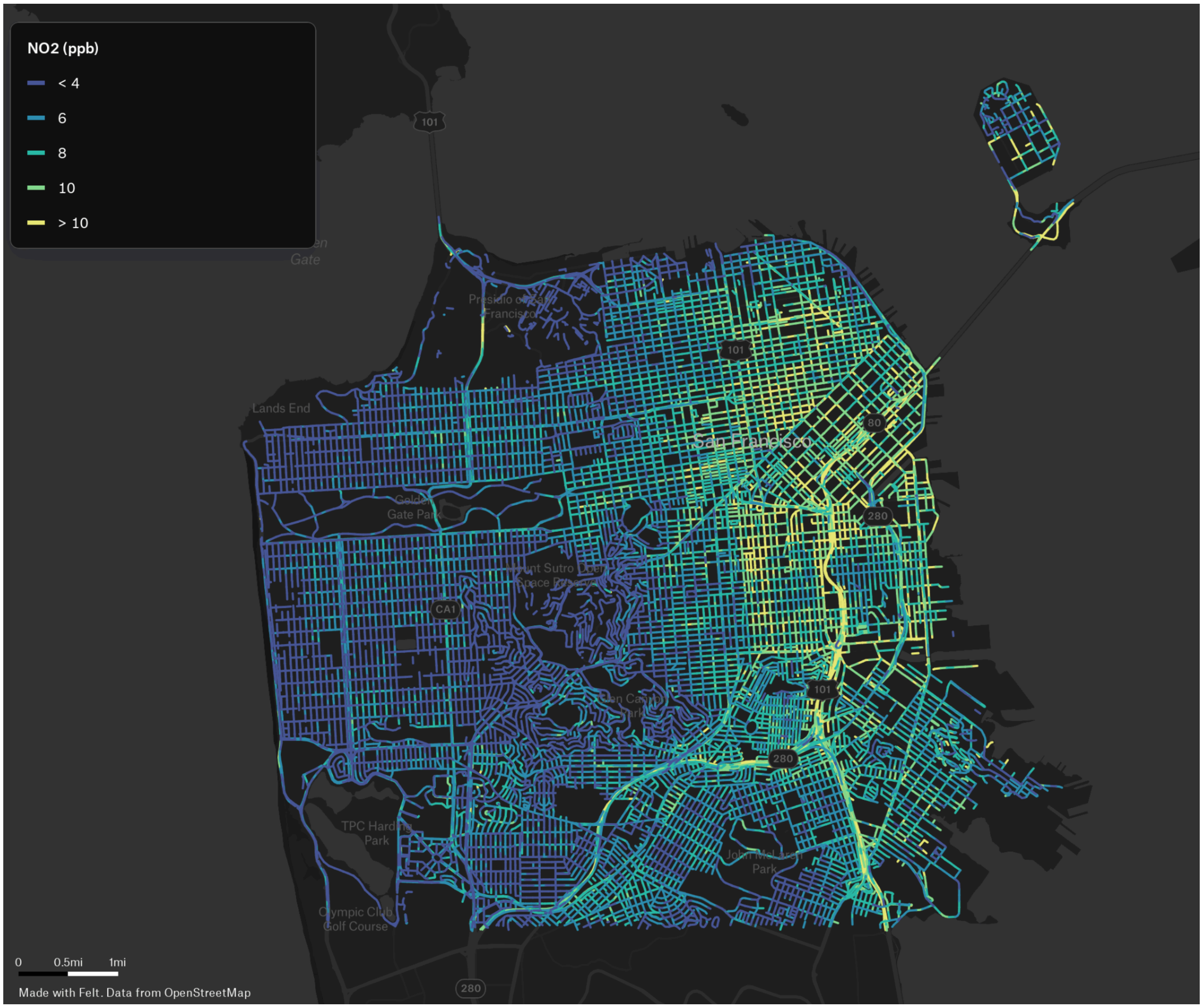

Figure 3: Example of plotted ambient concentration estimates for NO2 in the San Francisco Bay Area, CA, showing typical concentrations observed over a 1 year monitoring period. This example shows how high NO2 concentrations (as illustrated by the brighter green colors) are disproportionately impacting the eastern parts of the city. This plot uses data generated by the broad area monitoring method.

The suite of pollutants measured by the AMP supports the exploration of many source types identified by the community. Black carbon measured in combination with NO2 and other combustion related pollutants help identify areas impacted by diesel particulate matter pollution. TVOC data help identify areas where organic toxic air contaminants may be located. Methane and ethane data combined with other pollutants help identify locations of elevated biogenic methane, which can indicate emissions from landfills.

Targeted area monitoring: a subset of monitoring vehicles focuses on specific air pollution concerns (sources or impacted areas) at smaller spatial scales and shorter time periods. This measurement strategy involves monitoring over a relatively small area over a shorter time period with more intensive driving (i.e. more samples in a specific area on any single day). Targeted area monitoring tells us more detail about a specific concern, such as the exact makeup of chemicals being emitted from a particular facility, what areas of a community are most impacted in the immediate vicinity of pollution sources, or what times of day these areas are most impacted. Targeted area monitoring vehicles will either be drawn from the broad area monitoring fleet (Aclima Mobile Platforms) or from a special mobile laboratory fleet (a small number of vehicles with higher accuracy/precision sensors detecting a wider range of pollutants including toxic air contaminants), depending on the specific source of concern. In contrast to the broad area monitoring approach, the number of concerns that can be addressed is much more limited, but the depth at which the data about the concerns can be collected and analyzed is potentially greater.

Targeted area monitoring vehicles can be deployed in different ways to meet different objectives.

- *Fenceline driving* (Figure 4) gathers data systematically on predetermined routes around the perimeter of a known or suspected source facility/site. Fenceline driving can help determine the chemical makeup of emissions from a known source.
- *Transect driving* (Figure 4) follows a path designed to go upwind, through, and downwind of a potential plume of pollution from a known or potential source. Transect driving can help us better understand the chemical makeup of emissions in a plume, and where the plume is impacting in the local community.
- *Pseudo-stationary driving* approximates a more traditional stationary monitoring approach by temporarily stopping a monitoring vehicle within a potential plume of pollution from a known or potential source. Pseudo-stationary driving can help us better understand how pollution from a source varies in time. It can also allow for measurements of certain pollutants where measurement methods require longer sampling times (minutes up to an hour).
- *General Survey driving* is repeated monitoring along a predetermined route or on all roads within a predetermined area, attempting to collect air pollutant data evenly across time

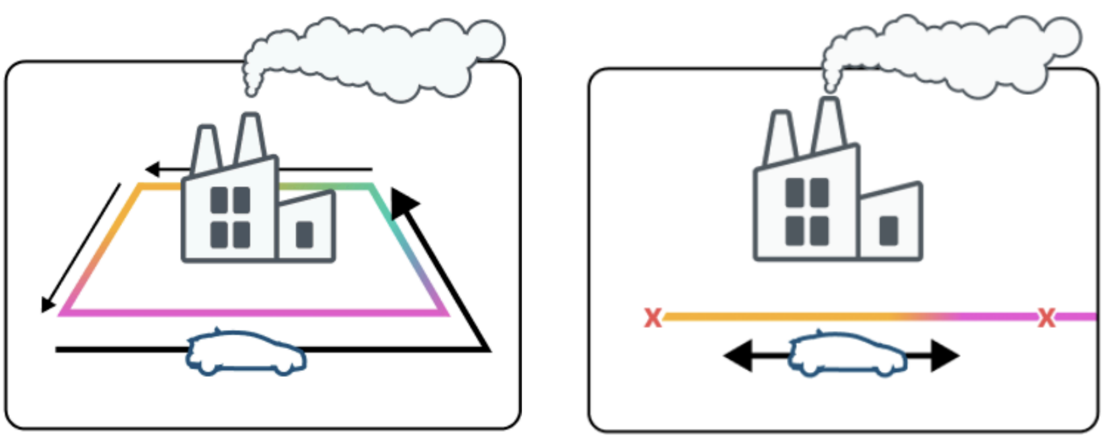

Figure 4: Example measurement technique for targeted area monitoring using (left) fenceline driving systematically surveys around the perimeter of a known or suspected source facility/site and (right) transect driving following a path designed to sample upwind, in, and downwind of a potential plume of pollution from a known or potential source.

Targeted area monitoring for West Stanislaus County will be conducted by Berkeley, and additional information about the targeted area monitoring can be found in Section 8.3. The suite of pollutants for monitoring by Berkeley includes benzene, toluene, naphthalene, acrolein, and other organic air pollutants that are relevant to the mixture of air pollutants expected from the concerns and sources identified in Section 2. The Berkeley mobile lab was selected for this study due to the complex mixture of pollution sources concentrated in a small area in Patterson.

4.3 Community-defined concerns, objectives, and analysis plans

The community engagement process has defined a range of air pollution concerns. These concerns were translated into specific high-level monitoring objectives and sub-objectives, which in turn allowed the selection of appropriate mobile monitoring methods and data analysis plans to collect the type of data needed to address gaps in prior monitoring efforts and to address specific community concerns. Not all concerns and identified pollution sources are assigned specific monitoring objectives. In some cases it is because the measurement methods for monitoring the sources are not available to address the specific pollution sources. More generally, however, it is because resources for targeted area monitoring are limited across the entire SMMI project (64 different communities) and not all concerns can be directly addressed through the targeted area monitoring approach. While the concerns listed below will be the primary focus of the monitoring in West Stanislaus County, the final collected data set can be further analyzed beyond the scope of SMMI to address a much wider set of concerns and sources.

Table 5 below provides an outline of the community specific concerns, objectives/sub-objectives, mobile monitoring methods, and data analysis approaches that may support actions to reduce emissions or exposure in a community. More details on the monitoring methods and presentation approaches can be found in Section 8 and Section 13, respectively.

Table 5: Community-defined concerns, objectives, and analysis plans

Community Concern	Primary Monitoring Objective	Monitoring Sub-objective	Mobile Monitoring Methods	Analysis Approach
Patterson. Industries located along 3rd and M Streets, North 1st Street, Park Center Drive, and Keystone Pacific Parkway	Characterizing Sources	Spatial Distribution Key pollutants Pollutant levels	Targeted Area: General survey Conducted by UC Berkeley	Ambient concentration map of key pollutants, Clusters of enhancement detections on a map Statistics on detections Area-wide chemical breakdown bar/pie graph Area-wide statistics on pollutant levels
G & V Trucking - on Hito drive	Characterizing Sources	Pollutant levels Locations impacted	Broad Area Monitoring	Clusters of enhancement detections on a map Statistics on detections

Gasoline / convenience store next to the United Community Center	Characterizing Sources	Pollutant levels Locations impacted	Broad Area Monitoring	Clusters of enhancement detections on a map Statistics on detections
Traffic congestion in school areas (North 7th Street and West Las Palmas, M Street and Ward Avenue, and American Eagle Ave and Shearwater Dr)	Identify Disproportionate Impacts	Pollutant levels Locations impacted	Broad Area Monitoring	Clusters of enhancement detections on a map Statistics on detections
Highway 33 and Sperry Avenue	Identify Disproportionate Impacts	Locations impacted Pollutant levels	Broad Area Monitoring	Clusters of enhancement detections on a map Statistics on detections
Distribution or last mile warehouse	Identify Disproportionate Impacts	Locations impacted Pollutant levels	Broad Area Monitoring	Clusters of enhancement detections on a map Statistics on detections
Pesticide applications	Characterizing Sources	Key pollutants, Pollutant levels Locations impacted	Contingent study*	Area-wide chemical breakdown bar/pie graph Area-wide statistics on pollutant levels

* Contingent studies will not be a planned focus of monitoring efforts, but could be undertaken in response to certain events such as pesticide applications, harvest events, dust storms, or other significant air pollution events.

5. Project roles and responsibilities

The SMMI defines the roles and responsibilities of various stakeholders in the community monitoring. The Community Engagement Plan details these roles and responsibilities and outlines how different groups will work together for community engagement. This section outlines the organizational structure for the SMMI partners (Figure 5), a list of community organizations that are Engagement Leads, and a list of the PEG members (Figure 6). Information on the SMMI project, including links to Engagement Leads, PEG members, and PEG meetings is also available at https://aclima.earth/ca-smmi. Responsibilities for Engagement Leads and PEG members are laid out in Section 1.1 in detail.

CARB's Monitoring and Laboratory Division is responsible for funding, managing and overseeing the project and ensuring it meets all contractual requirements. Aclima is the primary contractor for the project and is responsible for designing and implementing a plan for statewide community engagement, developing CAMPs for all project area communities, deploying mobile platforms to collect data, managing and analyzing data, and developing public reports. CARB and Aclima meet weekly to discuss project updates and ensure the project is progressing.

Based on the project's Community Engagement Plan, Valley Improvement Projects, the Engagement Lead for West Stanislaus County, plans and implements community outreach and engagement for the project, with the goal of understanding specific community concerns around air pollution. In addition to the distribution of an air pollution survey, Valley Improvement Projects holds and conducts outreach for two community meetings focused on local air pollution concerns that are tailored to the specific linguistic, cultural, and accessibility needs of the community. Valley Improvement Projects then summarizes community air pollution concerns for Aclima to translate into the CAMP. Community members play a crucial role in providing their knowledge and experiences with air pollution both through participating in the community meetings and through completing the air pollution concerns survey. The Project Expert Group guides community engagement and decision-making throughout the project, meeting eight times over the project period in meetings facilitated by Aclima.

SMMI Partners

Figure 5: SMMI Project Organizational Chart

Community Organizations

Engagement Leads lead and co-manage community engagement efforts in the designated communities

- Acterra
- Breathe SoCal
- Californians for Pesticide Reform
- Canal Alliance
- CCEJN
- Center for Community Action and Environmental Justice (CCAEJ)
- Center on Race, Poverty, and the Environment
- Citizen Air Monitoring Network
- Clean Water Fund
- Climate Action Campaign
- Community Agency for Resources, Advocacy and Services (CARAS)
- Cool OC
- Day One
- El Concilio
- Girl Plus Environment
- Greenbelt Alliance
- HARC, Inc.
- Healthy Fresno Air
- HOPE Collaborative
- Just Cities
- Leadership Counsel
- Los Amigos de la Comunidad
- Madera Coalition for Community Justice
- One Treasure Island
- Our Children's Earth Foundation (for Rodeo Citizens Association)
- Pacoima Beautiful
- Rise South City
- Sacramento EJC
- San Leandro 2050
- SOMCAN
- Sustainable Contra Costa
- Sustainable Solano
- The Niles Foundation
- Tri-Valley Air Quality Climate Alliance
- UNIDOS Network
- United for Justice
- Valley Improvement Projects
- Valley Onward
- Valley Vision

Project Expert Group

A cross-sector group of representatives from local air districts, community-based organizations, academia, and residents from overburdened communities that guides community engagement and decision-making for this project.

- Nader Afzalan
- Stephanie L. Mora Garcia
- Brent Bucknum
- Mikela Topey
- Agustin Angel Bernabe
- Amelia Stonkus
- Anna Lisa Vargas
- Gustavo Aguirre Jr
- Jamallah Green
- Jonathan Mercado
- Ken Szutu
- Lillian Garcia
- Moses Huerta
- Ms. Margaret Gordon
- Brad Dawson
- Kate Hoag
- Lily Wu-Moore
- Payam Pakbin

Figure 6: List of Engagement Lead organizations and PEG members for SMMI

How will monitoring be conducted?

6. Data quality objectives

Data quality objectives (Data Quality Objectives) are a series of goals set to make sure that the data collected, the analyses performed, and the visualizations produced are of good enough quality to address the stated monitoring objectives. These goals can be related directly to the quality of the measurement method, for example the accuracy or the precision of a sensor. They can also be more qualitative goals that determine how the measurement data is analyzed and visualized to accurately address community air quality concerns without being misleading. Data quality indicators are sometimes included as part of a data quality objective and are specific metrics that can be used to tell how good a measurement is. Some commonly used data quality indicators are data completeness, precision, bias, or limit of detection. Additional information on these and other data quality indicators can be found in Appendices C, D, E, G, and F.

Mobile air quality monitoring enables a variety of high-resolution spatial analyses that support different air monitoring objectives. One output uses time-resolved data from multiple individual drives of the same location to identify areas where pollution concentrations vary substantially and persistently from local background levels, indicating a probable local emissions source. This supports the air monitoring objective of attempting to identify and characterize pollution sources. Another output is the creation of maps of typical air pollution concentrations at block-by-block resolution that show areas of persistently high or low levels of individual pollutants, supporting the air monitoring objective of identifying areas of disproportionate impact.

Different monitoring objectives have different data quality objectives. The two primary monitoring objectives for SMMI and their associated data quality objectives are:

1. **Identify and characterize air pollutant emission sources**

   Typical pollutants of interest: CH_4, C_2H_6, BC, $PM_{2.5}$, NO, CO, TVOC, benzene, toluene, naphthalene, acrolein

   Data quality objectives:

   a. Find and map spots where pollution is likely coming from by detecting noticeable spikes in measurement readings that are clearly above normal background levels. More specifically, this means that the spike measurement must have a signal to noise ratio of at least 3.
   b. Make sure that we have high confidence in the locations where pollution emissions sources are detected. In other words, we want to minimize the presence of “false positives” in the resulting data. This is done by making sure that multiple detections of emissions sources occur in the same location before identifying it as a likely source of pollution. This can be quantified as the number of detections per visit to a particular location.
   c. Aclima will monitor and track the performance of each underlying measurement using the following key data quality indicators: gain drift and limit of detection

2. **Identify disproportionate air pollution impacts**

   Typical pollutants of interest: O_3, NO_2, $PM_{2.5}$, BC, benzene, naphthalene

Data quality objectives:

a. Produce an ambient concentration estimate of pollution for the monitoring area by collecting measurements at different times of day, day of week,and across seasons to account for natural variability of pollution levels.
b. Ensure data are spatially distributed throughout the entire user-defined area.
c. Produce concentration estimates at desired and practical spatial aggregation scales (e.g. hexbins, road segments).
d. Include a measure of confidence (i.e. a confidence interval) with each ambient pollution concentration estimate, so users can understand the reliability of the values and whether pollution levels are truly different between locations.
e. Monitor and track the performance of each pollutant measurement using the key data quality indicators of bias, drift, precision

These data quality objectives are largely qualitative goals that provide the foundation for the types of insights that mobile monitoring is designed to support. A critical aspect of quality assurance underlying these objectives is characterizing and maximizing the measurement quality of the air pollution measurements, particularly for the sensors. However, confidence in these data products will depend on a number of additional factors such as mobile monitoring strategy, the number of samples collected for features of interest (i.e. road segment or other spatial length scale), magnitude and variability in pollution concentrations, and meteorology over the contract period.

Data completion is an important quantitative data quality indicator in air quality monitoring as incomplete data can lead to biased conclusions from the data collected. Traditionally, data completeness is quantified across the time dimension, for example, number of data points collected per total time elapsed. With mobile monitoring, in some cases it is more important to quantify data completion in the spatial dimension, for example, total number of data points collected in a specific location compared to an expected number of data points in that location. Aclima's completeness metric for monitoring is discussed in Section 12. For the customized targeted area monitoring, metrics for completion are discussed in Section 8.3. Achieving completion for the monitoring plan relies on individual sensors having high temporal data completeness rates and uptime. Completeness rates of 80% or higher generally allow for efficiently achieving the spatial completeness objectives. If completeness is below 80%, additional driving will be done to compensate in order to meet the monitoring completeness metrics. If this is not possible for specific monitoring objectives, the impact will be detailed in the final report.

The comprehensive quality assurance approach incorporates processes and metrics to minimize uncertainty. Achieving data quality objectives relies on more than just individual indicators, as real-world challenges (e.g., driver absences) and external events (e.g., wildfires) can affect data quality despite a robust QA plan. The primary aim of these objectives is to generate high-quality data with well-defined performance parameters, enabling effective aggregation and analysis of mobile data for informed decision-making and pollution reduction initiatives across various applications. Section 12 details the evaluation of the effectiveness in meeting these data quality objectives.

7. Monitoring methods and equipment

Aclima will deploy two distinct but complementary monitoring methods enabled by the use of a mixed fleet of AMPs and PMLs:

- **Broad area monitoring** collected by AMPs, with mobile monitoring guided by dynamic algorithm in monitoring areas defined by the community as areas of high pollution concern during community meetings and through survey submissions
- **Targeted area monitoring** for investigations of specific sources and areas of concern, collected by the UC Berkeley PL with mobile monitoring guided by community-defined air quality concerns and monitoring objectives

7.1 Monitoring equipment

Broad area monitoring as part of this CAMP will be conducted using a fleet of Aclima Mobile Platforms (AMPs, Figure 7).

Figure 7: An Aclima Mobile Platform.

All AMPs have a standardized measurement suite that covers a core range of priority pollutants and greenhouse gases (GHGs) shown in Table 6, operating at a collection frequency of every second (with the exception of ozone which is measured every 2 seconds). The Aclima fleet will conduct broad area monitoring measurements during different times of day and different days of the week.

Table 6: Air pollution and greenhouse gas species measured by the AMP.

Pollutant	Measurement Frequency
Carbon Monoxide (CO)	1 sec
Carbon Dioxide (CO2)	1 sec
Nitric Oxide (NO)	1 sec

Nitrogen Dioxide (NO2)	1 sec
Ozone (O3)	2 sec
Methane (CH4)	1 sec
Ethane (C2H6)	1 sec
Total Volatile Organic Compounds (TVOC)	1 sec
Fine Particulate Matter	1 sec
Black Carbon	1 sec

Experienced scientists from academia and industry will be deploying 3 Partner Mobile Laboratories (PML) that are equipped with instruments that measure a wide set of speciated air toxics. The PMLs are research groups from UC Berkeley, Aerodyne Labs, and a consortium including researchers from UC Riverside, Baylor University, and University of Houston. Each vehicle is custom-built with different specifications and instrumentation. All 3 vehicles sample in real time with sample time ranging from 1 second up to 30 minutes, depending on the instrument. A full list of PML instrumentation and pollutants measured is available in Appendix I.

For West Stanislaus County, the Berkeley PML will be conducting the targeted area monitoring. The Berkeley mobile air quality monitoring platform is based in a Ford Transit 250 medium roof van and is crewed by a driver and a passenger. The platform is comprised of a number of instruments to measure both criteria and hazardous air pollutants, in both the aerosol and gas phases, as well as other meteorological and state parameters. The gas-phase instrument package measures ozone (2B Tech 211G), carbon monoxide and N_2O (Aeris MIRA Ultra CO/N_2O), methane and ethane (Aeris MIRA Ultra CH_4/C_2H_6), nitrogen monoxide and oxides of nitrogen (NO_X, Ecophysics nLD 855), nitrogen dioxide through two different methods (Ecophysics nLD 855 and Aerodyne Cavity Attenuated Phase Shift Spectrometer [CAPS]), carbon dioxide (Licor LI-7200 RS), and water vapor (both Aeris MIRA Ultras and the Licor). Additionally, volatile organic compounds, e.g. benzene, toluene and more (see CAMP Appendix G.2 for full list) are measured using an Aerodyne Vocus proton transfer reactor time of flight mass spectrometer (Vocus PTR-TOF-MS). The aerosol-phase instrument package includes measures of total suspended particulates (TSI wCPC 3789), particulate matter loadings ($PM_1/PM_{2.5}/PM_{10}$, Palas FIDAS), and black carbon through two different methods (Magee Aethelometer AE33 and Droplet Measurement Tech. Photoacoustic Extinctiometer). Incoming solar radiation is reported by a solar radiation sensor (MetOne Model 094). An Airmar 200WX is used for meteorology including temperature, humidity, pressure, wind speed and direction. A GPS unit (ublox M8Q) provides location and position information.

7.2 Monitoring methods - broad area monitoring

In broad area monitoring, Aclima's fleet of Mobile Platforms will collect data within the community defined monitoring area boundary. AMPs will measure on publicly accessible roads within this boundary, gathering repeat measurements at different times of day, days of the week, and seasons.

Aclima will conduct monitoring within the defined boundary such that the fleet will complete an average of 20 repeat measurements distributed across all residential and major roads in all census block groups to provide adequate coverage throughout the monitoring area. However, rather than specify the number of samples on any specific length of road within each census block group, Aclima uses a dynamic mobile sampling algorithm that is updated daily with the specific goal of collecting data that will maximize improvement in the characterization of a location's air quality. This approach ensures that sufficient measurements are collected in areas where greater pollutant variability requires additional sampling to achieve representativeness, or measurements that are representative of the conditions across the specific monitoring period. The system uses observed data in combination with predictive models to prioritize data collection where there is specific need based on observed characteristics like a large mis-match between the expected and observed air quality at a location, a relatively small amount of data collected to date, a need for a greater density of data collection at a specific location based on an identified community need, and other air quality considerations.

The mobile sampling algorithm ensures sufficient data collection to support the calculation of spatially resolved ambient concentration estimates. In addition, the method supports source identification and assessment of disproportionate impacts by directing more sampling either in regions where there is larger variation in pollution concentrations or around locations of interest for the community. For a detailed discussion of the broad area mobile monitoring and the dynamic mobile monitoring algorithm, see Aclima's QA documentation in the Appendices C, D, and E.

The broad area monitoring boundary for West Stanislaus County is shown in Section 8: Monitoring Areas.

7.3 Monitoring methods - targeted area monitoring

UC Berkeley will conduct targeted area monitoring that focuses on specific air pollution concerns at smaller spatial scales. This involves monitoring over a relatively small area over a shorter duration in time (approximately 1 to 2 weeks) and is designed to complement the broad area monitoring coverage by providing more in-depth information about a specific area of concern. This can provide both enhanced characterization of pollution sources as well as an assessment of the locations of concern and sensitive receptors in the community that are impacted by source emissions. Targeted area monitoring is designed to perform detailed chemical, temporal, and/or spatial characterization at a select number of locations of concern identified by communities. The characterization can include aspects such as denser temporal information about pollutants by time of day, detailed chemical speciation around sources of concern in a particular area, or spatial information about the location of an emission source and extent of the areas and people impacted by the source.

The mobile monitoring method for targeted area monitoring is different from that used for broad area monitoring. By the nature of targeted area monitoring, a more customized driving method is necessary to support air monitoring objectives and concerns specific to individual communities. As with the broad area monitoring, representativeness is achieved by conducting repeat measurements to sufficiently characterize pollutant concentrations; however, the repeat measurements will typically (though not exclusively) occur over a more condensed time period in these targeted investigations.

Section 8 (Monitoring Areas) details the targeted area monitoring study that will be conducted in West Stanislaus County.

7.4 Strengths and limitations of mobile monitoring

Because of the nature of mobile monitoring and how it differs from stationary monitoring, there are inherent strengths and limitations to the approach.

- Mobile monitoring can cover more area at a higher spatial resolution than stationary networks (i.e. fewer spatial gaps in coverage). However, because mobile monitoring vehicles can only spend a limited period of time at a given location, there may be gaps in time for that location where monitoring data is not available.
- Mobile monitoring sensors and instruments can gather valid data on a wide variety of important pollutants for informing community action, but to achieve high spatial resolution, gather data on fewer pollutants and at lower precision and accuracy than is possible in stationary networks. As a result, mobile monitoring sensors are not certified by the U.S. EPA for gathering data that can be compared against national ambient air quality standards (NAAQS) and used in regulatory actions under the Clean Air Act. For certain regulatory actions, a follow-up study using U.S. EPA-approved monitoring methods may be necessary.
- While mobile monitoring can provide a significant amount of information across a given geographic area, monitoring vehicles may be present in that area for a limited period of time. This may mean rare events or seasonal patterns are not captured in the dataset.

8. Monitoring Areas

8.1 Community Mileage Allocation

A requirement for SMMI is that at least 50% of the population in the areas monitored are living in areas designated as Disadvantaged Communities (DAC), as defined by the top 25% of CalEnviroScreen scores under SB535 . Across all CNCs designated for monitoring as part of SMMI, the total population is approximately 7.9M people, of which 2.9M people live in DACs (approximately one quarter of the California-wide DAC population). Aclima's monitoring resourcing scales with the length of roads contained within the selected monitoring area; in other words, more vehicles and drivers are required to monitor areas with a higher total length of roads. For all CNCs combined the total contained road length is approximately 18,000 miles[1]. The DAC census tracts combine to about 6700 miles. Aclima determined that allocating resources for SMMI such that approximately 12,000 miles of roads could be covered would allow for covering the DAC communities while also keeping the total % of DAC population at 50% or above, whereas adding additional resources would reduce the percentage of DAC population receiving monitoring resources. The implication of this is that because not all communities will receive monitoring resources to cover the entire community, an equitable process for allocating monitoring resources per community would need to be developed that would ensure that communities with higher proportions of DAC population will receive more monitoring resources . In consultation with the Project Expert Group (PEG), Aclima developed a method for allocating monitoring resources for broad area monitoring across the 64 CNCs that are part of the SMMI. The approach involved 3 steps:

1. The total number of available road miles was distributed across air districts according to the proportion of population contained within the CNCs in each of the 5 air districts containing the 64 CNCs (Imperial County, South Coast, San Joaquin Valley, Sacramento Metro, and Bay Area)[2]. This resulted in 100% of the road miles for CNCs in Sacramento, San Joaquin, and Imperial County Air Districts being allocated, because the proportion of these air districts' population is higher than their proportion of the CNC road miles compared to that over all CNCs. For the Bay Area and South Coast CNCs, there were more miles present within the CNCs

[1] Only major and residential road types are considered in estimates of monitoring area road miles for resourcing purposes; however, all accessible road types, which includes major, residential and highways/freeways, will be driven.
[2] The populations used for each Air District in this calculation are: Bay Area - 2838232; Imperial - 15330; Sacramento Metro - 138633; San Joaquin Valley Unified - 687473; South Coast - 4573865.

than there were miles available, and therefore a method was required for allocating the remaining miles among individual CNCs.

2. A customized prioritization metric for each census tract across all CNCs was defined to rank CNCs according to various socioeconomic and environmental indicators. This prioritization method was defined in consultation with the PEG. A description of how this prioritization metric was defined is given below.
3. Individual census tracts within CNCs were successively selected based on this customized ranking until the total road miles available for monitoring in each air district was exhausted. The road mile length of the census tracts selected is added up for each CNC, and that total is the number of miles available for monitoring for that CNC. The total number of miles assigned to each community by this method is presented in Appendix B.

The prioritization metric was created as an alternative to the CalEnviroScreen (CES4.0) score, addressing concerns raised by the PEG about the relevance of many of the metrics used in CalEnviroScreen as applied to the SMMI. Note that because the DAC communities are defined based on CES (under SB535), the PEG's prioritization metric will result in some non-DAC communities being prioritized over DAC communities. The methodology Aclima used, in coordination with the PEG, is outlined below.

- Aclima proposed a customized weighting of individual environmental and socioeconomic indicators relevant to the SMMI monitoring methodologies (including some in CalEnviroScreen plus others). The weighting was determined by a survey of PEG members, who collectively assigned weights to each available indicator.
- Survey Score Normalization: The Max/Min method was used to normalize the survey responses from PEG members to a scale of 0 to 1. This ensured that individual respondents' tendencies to give consistently higher or lower ratings did not skew the overall results.
- Indicator Weighting and Scoring: The normalized raw survey results were used to create weighting factors for each indicator. These weighting factors are shown in Appendix B. For each census tract, a mileage allocation score is derived by converting each indicator value into a percentile rank across all census tracts contained in the CNCs. This rank is multiplied by its corresponding weight, summing across all indicators, and normalizing to a value between 1-100. The indicators were taken from CES 4.0 and two additional non-CES indicators were added: the density of AB2588 Air Toxics Hot Spots and the density of large permitted sources, both measured as the number of sources per unit road length in census tracts. Some of the sources in the inventory had no emissions reported; these sources were first removed before calculating the density of sources.
- Final Score Calculation: The weighted scores for each indicator were summed for each census tract. This summed result was then normalized to a scale of 1-100 to create a PEG mileage allocation score for every census tract contained within the 64 CNCs. The final indicators and scores are available in Appendix B.

While this approach resulted in census tracts with the highest prioritization scores being prioritized within CNCs for the purposes of mileage allocation, the Community Engagement Plan (Appendix A) outlined a process for the Engagement Leads to work with communities directly to use the road mileage budgeted to select monitoring boundaries according to the priorities indicated by the communities. While this process empowers the local communities to make the decisions about where to direct monitoring, it should be acknowledged that the final monitoring area boundaries may not necessarily include the most disadvantaged communities as defined by established metrics such as CalEnviroScreen or by the PEG-developed metric.

The Engagement Lead for West Stanislaus County requested that the mileage allocation for this CNC as well as South Modesto and West Modesto be combined into a single total. The total mileage across the 3 communities (for residential and major roads only) is 987 miles, and 100% of these miles were allocated through the process defined above.

8.2 Broad Area Monitoring Coverage

Aclima's vehicles will gather detailed location-based and time-based pollution measurements throughout the community. This will happen over a nine-month period as the vehicles drive on roads that are open to the public. The specific neighborhoods where this mobile monitoring will take place were decided by the community members themselves during meetings led by the Valley Improvement Projects. Broad area monitoring will occur consistently across a 9 month period from June to March, with repeat frequency in all locations (at the census block level) on average approximately once every 2 weeks.

The maps below identify the region selected by the community for broad area monitoring along with location characteristics about known air pollution sources and community-identified concerns. Meteorological data (wind speed and direction) will be collected on the mobile platform and will be an additional location based characteristic for incorporating into analysis and interpretation of data.

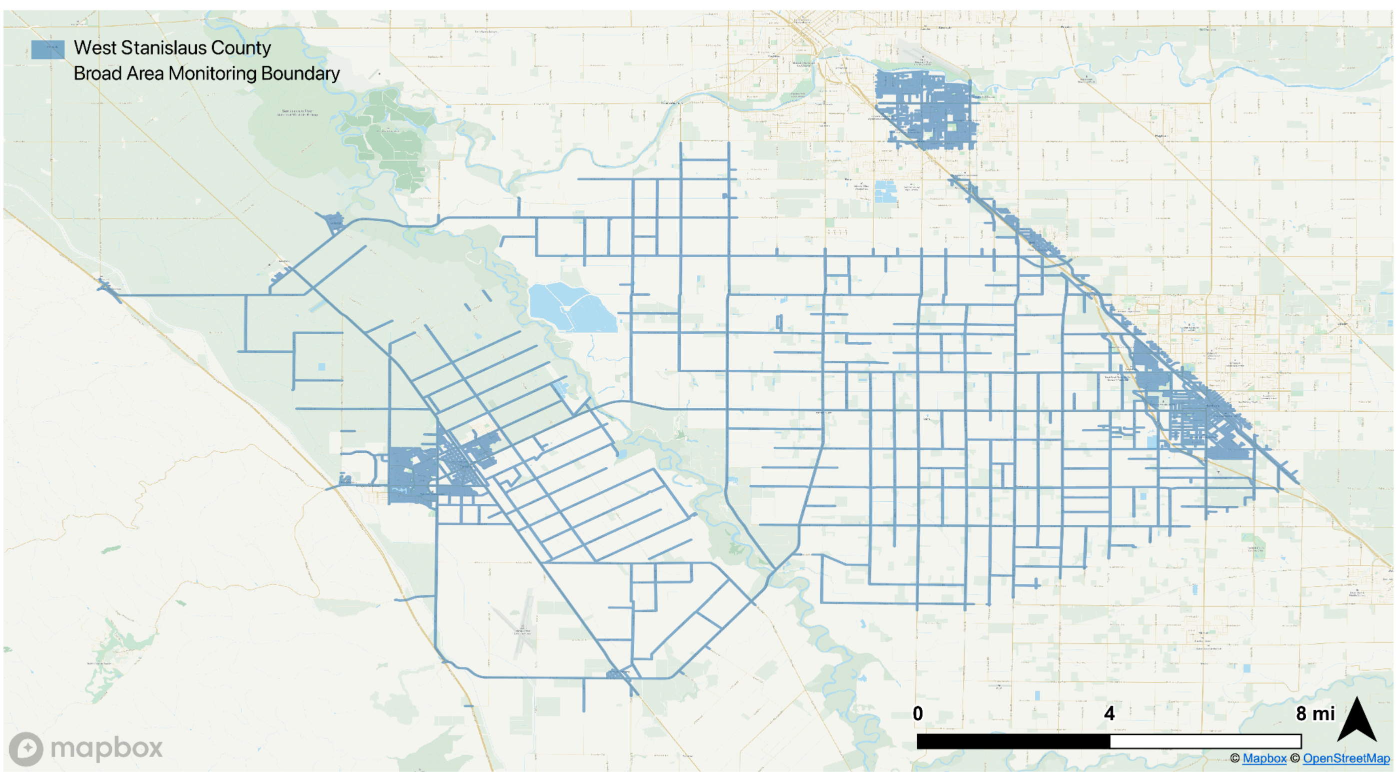

Figure 8: Map of areas selected for broad area mobile monitoring by West Stanislaus County community members.

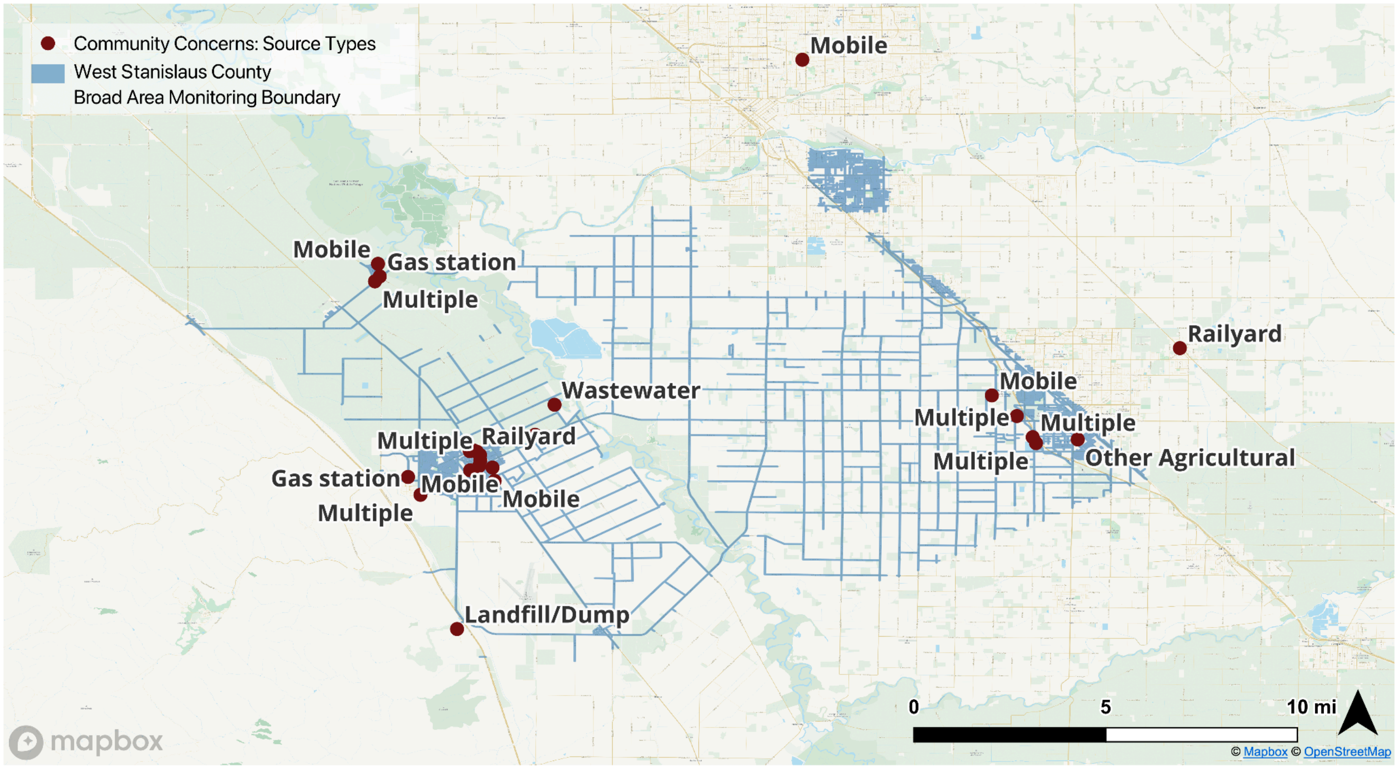

Figure 9: Map of the West Stanislaus County broad area monitoring boundary and local air quality community concerns. Concerns noted by West Stanislaus County community members include traffic congestion, gas stations, wastewater treatment, an Amazon distribution center, the Stanislaus County Landfill, facilities in industrially-zoned areas, animal feedlot and processing facilities, and agricultural pesticide use. Several community concerns are clustered in the cities of Patterson and Turlock. See figures below for closer detail in these regions.

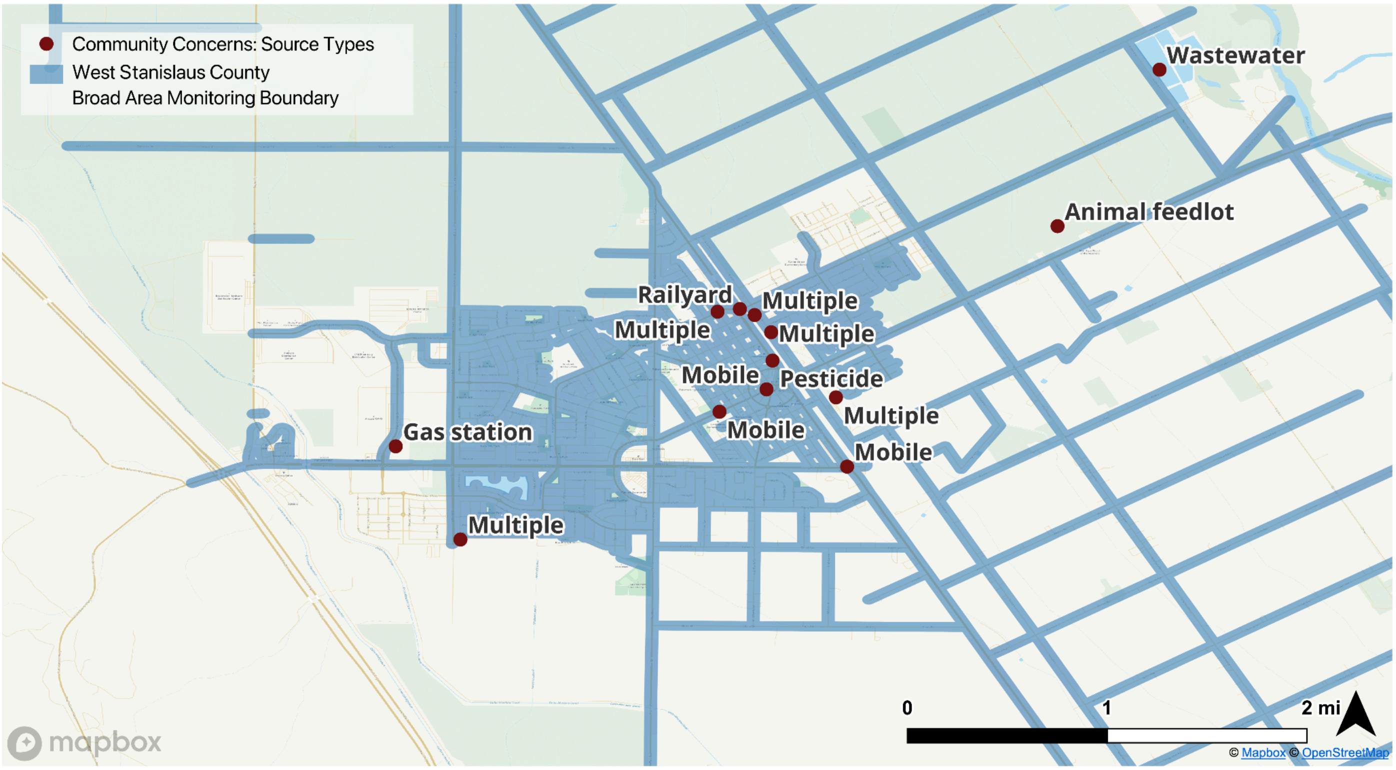

Figure 10: Zoomed-in view of West Stanislaus County community members' concerns around the City of Patterson. Concerns local to Patterson include a railyard, truck traffic along Highway 33, Largo Concrete Inc., the City of Patterson Water Quality Control Facility and surrounding canals, an animal feedlot to the northeast, industrial areas along 3rd Street and M Street, and pesticide usage.

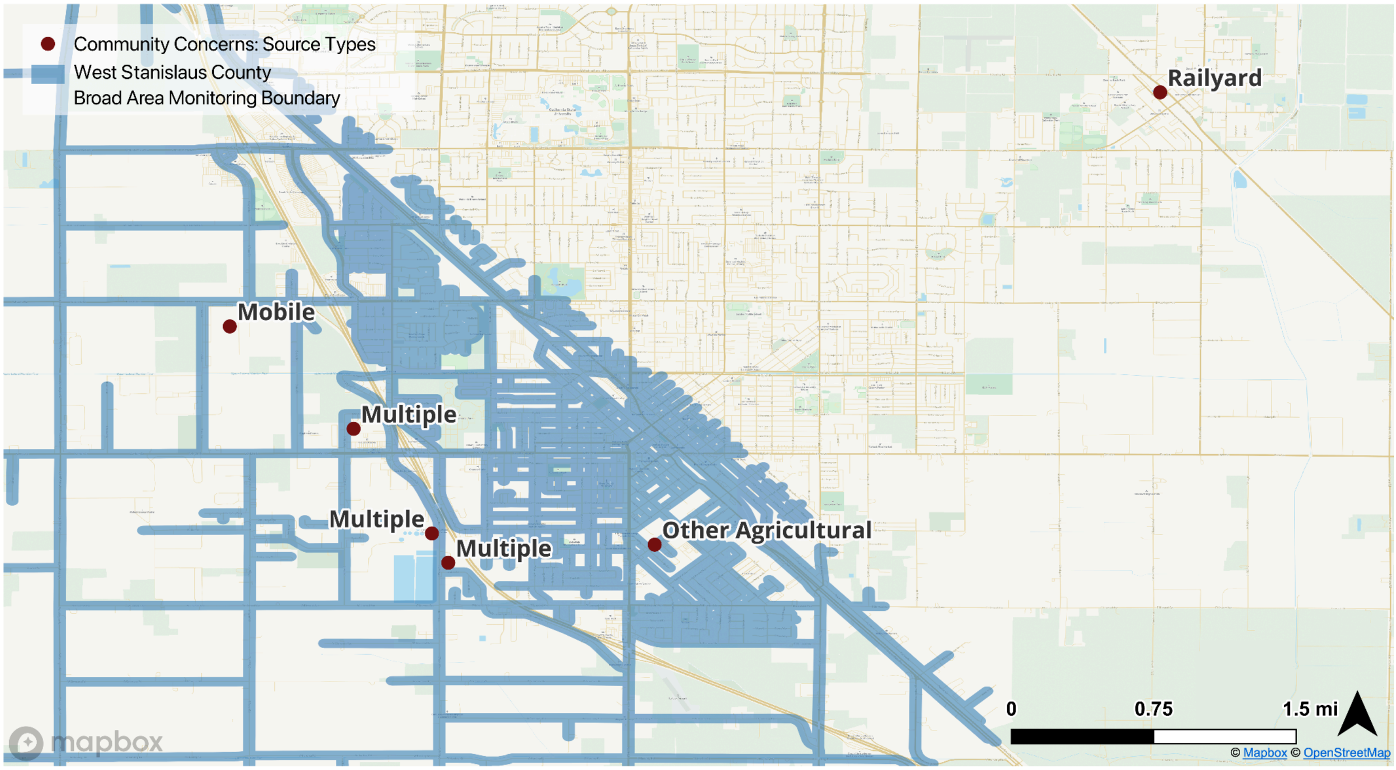

Figure 11: Zoomed-in view of West Stanislaus County community members' concerns around the City of Turlock. Concerns local to Turlock include the local Amazon Distribution Center, the City of Turlock Transfer Station, local elementary and high schools, and wastewater treatment.

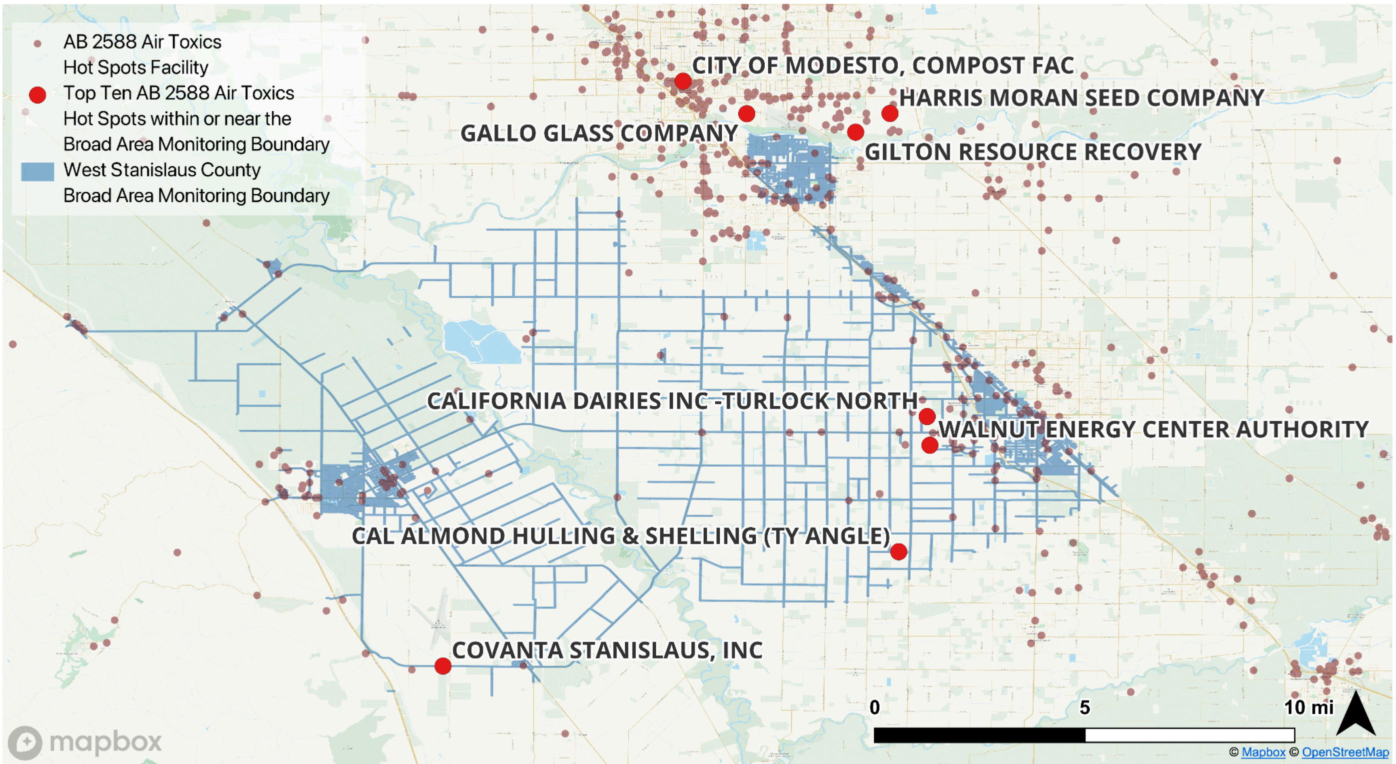

Figure 12: Map of AB2588 hotspots within two miles of the West Stanislaus County broad area monitoring area boundary. The top 10 hot spots, based on total toxicity-weighted emissions (TWE), are emphasized. Facility operations at these sources include glass production, agricultural product processing and preparation, refuse processing, composting, milk product processing, and gas-fired combined-cycle power generation.

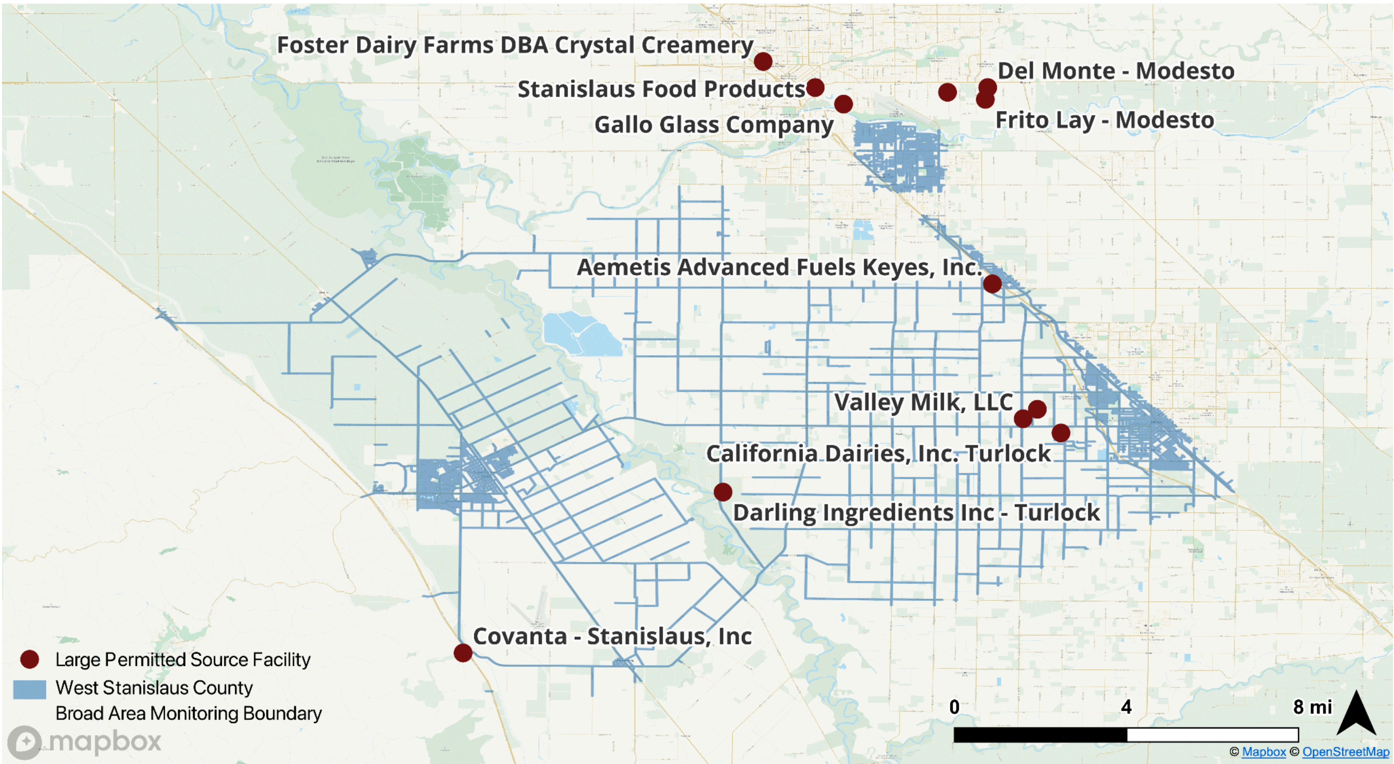

Figure 13: Map of large permitted facilities within or near the West Stanislaus County broad area monitoring boundary. Large facilities local to this CNC include the Gallo Glass Company, Stanislaus Food Products, Frito Lay - Modesto, Darling Ingredients Inc - Turlock, and SunOpta Aseptic.

8.3 Targeted Area Monitoring

Targeted area monitoring studies are designed to flexibly address specific air quality concerns raised by communities. The monitoring method, data analysis approach, and visualization approach will be customized to collect, visualize, and interpret the data in a way that is most effective for providing results that can ultimately be used to take action to address the air pollution concern. Aclima and UC Berkeley, with guidance from the PEG, have developed a method that draws from a modular set of predetermined monitoring, analysis, and visualization approaches that can be combined in unique ways to address a number of different concern types and monitoring objectives.

The air quality survey, community meetings conducted by ELs, and other outreach conducted with community members and air district representatives identified and prioritized the community air quality concerns (detailed in Section 2.3).

From the concern and monitoring objectives, a monitoring, analysis, and visualization approach is selected that is most appropriate for providing actionable results to help address the community air quality concerns.

The targeted area study for West Stanislas County will be conducted by Berkeley mobile monitoring lab and will address the community identified concern about Patterson being a generally impacted area, specifically the industries located along 3rd and M Streets, North 1st Street, Park Center Drive, and Keystone Pacific Parkway with multiple different pollution sources of concern. The primary monitoring objective for this targeted area study is to characterize the location and type of pollution coming from the various sources in this area. As a secondary focus, the data collected may also be able to identify locations of disproportionate impact. Some of the pollution source types identified as being important in this area include emissions from truck idling, diesel generators, fertilizers, and pesticides. Some of the key pollutants that will be of focus include TVOC, Methane/Ethane, air toxics VOCs, black carbon, PM2.5, CO, and NO2. This targeted are study will be conducted using the following monitoring approach:

- **General Survey** Repeated monitoring along a predetermined route or on all roads within a predetermined area, attempting to collect air pollutant data evenly across time.

The Berkeley Mobile Lab will monitor West Stanislaus County (specifically in Patterson) by performing a general survey of areas immediately around the identified community concerns as well as sources listed in the AB2588 Air Toxics Hot Spots inventory. Additionally, transects of major roads throughout the entire community will be performed. This will address high emitting source concerns as well as producing multiple background measurements for the area. A drive plan will be constructed such that each targeted area/road is able to be measured within approximately 8 hours. This drive plan will be repeated at least 5 times between July 2025 and February 2026 with the starting location and pathing staggered such that repeat measurements of sources are completed at different times of the day to build up statistics. The route plan can be subject to change since the Berkeley Mobile Lab is piloted by an experienced team of atmospheric scientists, and routes are selected live according to incoming data streams when monitoring within community boundaries. This means that although the exact pathing of a drive can be altered on-the-fly, a drive will not be marked "completed" until a general survey around the identified community concerns/toxic air hotspots is performed. Some drives may therefore take longer than 8 hours or may need to be repeated if particularly interesting data are observed that require leaving the target area. Aclima and the Berkeley team will be in touch with the West Stanislaus County engagement leads when plans are finalized in order to alert the community. Community specific information about the local concerns and sources as well as the accessibility of certain roads can be discussed at this point in order to inform the mapping routes.

The map below shows the focus area for this targeted area study.

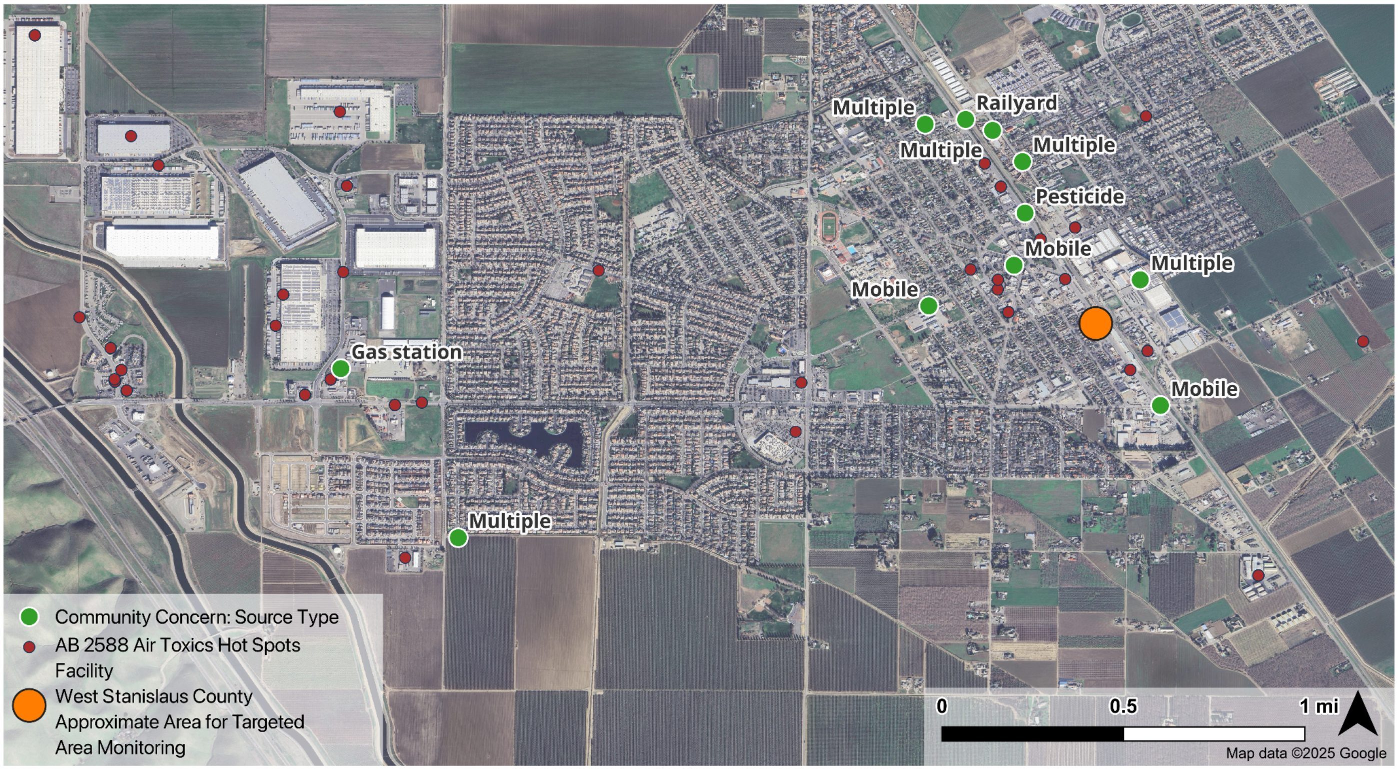

Figure 14: Map showing the approximate area for targeted area monitoring in Patterson, CA, on the western end of West Stanislaus County. The targeted area study will be conducted around industries located along 3rd and M Streets, North 1st Street, Park Center Drive, and Keystone Pacific Parkway. Community concerns shown in the map (green circles) are detailed in Section 2. Actual drive plan and extent of monitoring is to be determined based on conditions experienced during the broad area monitoring period. Also shown on the map are locations of community concerns and AB2588 Air Toxics Hot Spots.

9. Quality control procedures

Quality control procedures are an important part of all air monitoring plans because they outline the work that will be done before, during, and after the measurement period to make sure that the data collected meet our data quality objectives.

9.1 Aclima's Quality Assurance and Quality Control Procedures

Aclima has a comprehensive set of quality control (QC) procedures in place throughout the entire monitoring process, from the moment the sensors are installed into vehicles up until the final data is analyzed. These procedures help us track and minimize uncertainty, ensuring that the data collected is appropriate for the intended monitoring objectives. The following is a brief overview of these procedures. A full description of these procedures is included as accompanying documents in Appendices C, D, and E, including the frequency of QC checks conducted.

Ensuring Sensors Measure Accurately: Calibration

Calibration is a critical part of our quality control process. We compare our sensors against trusted reference instruments and standards to make sure they are reporting the correct pollutant levels. We do this at several stages:

- **Before Deployment (Pre-deployment Calibration):** Before our mobile monitoring vehicles start collecting data in the community, each sensor undergoes a thorough calibration process.
- **During and After Deployment (Calibration Check):** During and after a mobile monitoring period, the sensors are brought back to our calibration facilities and recalibrated using the same methods as before deployment. This helps us see if the sensors have drifted or changed their readings during the monitoring period. Calibration checks will occur approximately once every 6-8 weeks over the 9 month monitoring period.
- **Addressing Calibration Drift:** If we find that a sensor's calibration has shifted between any two calibration events, we carefully review the data and may apply adjustments to ensure the accuracy of the measurements taken during the monitoring period. The way we correct for drift depends on the pollutant and the type of data product (e.g., long-term averages vs. short-term spikes).

Ongoing Checks During Monitoring:

There are several ongoing checks that occur while mobile monitoring vehicles are in the field:

- **Driver Checks:** Our trained drivers perform daily visual inspections of the monitoring system, including checking sample lines and performing **PM zero checks** to ensure the system is operating correctly. They also monitor data connectivity and clean the black carbon sensor inlet.
- **Automated System Checks:** Our mobile platform continuously monitors various **system status indicators**, such as temperature, pressure, humidity, and flow rates within the sensors. If these indicators fall outside of acceptable ranges, the data is automatically flagged for review. This helps us identify potential issues early on.
- **Manual Data Review:** Our technical staff remotely monitor the incoming data and system diagnostics on a weekly basis to look for trends, unusual patterns, or potential sensor issues that automated checks might miss. We may compare our data to that from nearby regulatory air monitoring stations to provide context for how pollutants are generally behaving over time in the region.

Addressing and Correcting Issues:

If any issues are detected during our quality control checks, we have the following procedures in place to address them:

- **Troubleshooting and Repairs:** For minor issues, drivers may be able to perform simple repairs in the field. For more complex problems, sensors or even the entire Aclima Mobile Node (AMN) may be returned to our calibration facilities for repair, recalibration, or replacement.
- **Data Flagging and Exclusion:** If we identify data that is likely inaccurate due to a sensor malfunction or other issue, we flag this data in our system. Severely compromised data is excluded from further analysis to prevent it from affecting the final data products. Data that may have slightly higher uncertainty is noted and may be handled with more caution. Both the severity and the reason for flagging will be indicated

- **Data Adjustments:** If a calibration check reveals a consistent drift in a sensor's readings since the previous calibration, we may apply adjustments to the data collected during the deployment to improve its accuracy over that time period. All data modifications are carefully tracked in our database.

Table 7: Summary of Aclima QC Procedures and Frequency

Quality Control Activity	Frequency
Driver system checks (PM zeros, data connectivity, tubing and cable checks)	Daily
Manual data review	Weekly
Calibration checks (and subsequent recalibration)	Every 6-8 weeks
Routine Maintenance (internal filter or other consumables swaps, leak checks)	Every 6-8 weeks at calibration checks
Installation and Uninstall Checks (Flow checks, sample line cleaning, sample line filter swaps, etc)	Every 6-8 weeks at calibration checks
On-demand maintenance	As needed

Collocation of Aclima AMN at Regulatory Sites

Aclima AMNs will be installed at between 1 and 3 regulatory monitoring sites operated by CARB or local air districts across California for long term intercomparisons in order to directly compare Aclima's measurements to regulatory measurements. These intercomparisons will be evaluated and quantified using various Data Quality Indicators (DQIs) (e.g. bias, precision, mean bias error, R2, etc). As of the publication of this CAMP, an AMN has been installed at a regulatory site in Sacramento (Downtown Sacramento – T Street, 1309 T Street, Sacramento, CA) and an installation is planned for a regulatory site in Fresno (Fresno – Garland, 3727 N. 1st Street, Ste. 104, Fresno, CA).

Documentation and Oversight:

Aclima maintains detailed records of all our quality control activities. This includes calibration records, maintenance logs, data review notes, and any data adjustments made. Our Quality Assurance Manager is responsible for overseeing our quality assurance system, ensuring that our procedures are followed and that our data meets high quality standards. Results from calibration records will be summarized in the project final report.

9.2 Partner Mobile Laboratories Quality Assurance and Quality Control Procedures

The Berkeley PML QA/QC process includes weekly calibrations of gas-phase instruments using certified gas standards, and weekly baseline readings for particle-phase instrumentation. Data recovery is targeted at 90% for each day or drive, with repeats conducted if recovery goals are not met. Precision, measured through span checks and relative standard deviation comparisons, and accuracy, assessed through instrument responses to known gas concentrations, are regularly monitored and reported. Any significant change in precision or accuracy triggers a full diagnostics check. Table 8 shows the QA activities and their frequency. Additionally, data are continuously reviewed during acquisition for potentially problematic data records through instrument alarms. These alarms are flagged and recorded with a corresponding indication of whether the data is impacted or not. Data that are deemed faulty, either by automatic alarms or manual review, are flagged in the transmitted files.

A full description of these procedures are included in an accompanying document in Appendix G.

Table 8: Summary of Berkeley QC Procedures and Frequency

Quality Control Activity	Associated Instrument(s)	Frequency
VOC gas blend of 1 ppm 1,3-butadiene, 1,3,5-trimethyl benzene, 1 ppm acetaldehyde, 1 ppm acetone, 1 ppm acrylonitrile, 1 ppm ethanol, 1 ppm hexane, 1 ppm isoprene, 1 ppm limonene, 1 ppm m-xylene, 1 ppm methyl ethyl ketone, 1 ppm methyl vinyl ketone, 1 ppm toluene	Vocus PTR-TOF-MS	1x Weekly
5 ppm NO	CAPS NO_2 and Ecophysics $NO/NO_2/NO_x$	1x Weekly
1.9 ppm CH_4, 400 ppm CO_2, 0.1 ppm CO	Aeris CH_4/C_2H_6, Licor CO_2, Aeris CO/N_2O	1x Weekly
30 ppm CH_4, 1 ppm C_2H_6, 2000 ppm CO_2, 10 ppm CO	Aeris CH_4/C_2H_6, Licor CO_2, Aeris CO/N_2O	1x Weekly

10. Data management

The section briefly outlines how Aclima's system manages data from Aclima Mobile Nodes (AMNs) and Partner Mobile Laboratories (PMLs) throughout the SMMI campaign, fulfilling specific Scope of Work elements related to data management procedures and transfer mechanisms. A detailed description of Data Management can be found in Appendix F.

10.1 Data categories and levels

Data collected as part of this CAMP will range from 1-second measurements used for analysis, combinations or summaries of data collected throughout the observation period, and more rapid alerts of the detection of high concentrations. Aclima organizes these data further into levels reflecting the degree of processing, from the lowest level (Level 0, or L0) at sensor readout to high level (Level 4, or L4) modeled analyses which synthesize individual data points into actionable insights and data summaries for dissemination through visualization and reporting.

Table 9: Aclima's Data Processing Levels. Asterisks (*) indicate data levels provided to CARB or in support of non-scientific communication and community visualization.

Data Level	Name	Definition	Example
0	Raw Signal	Original signal produced by the sensor.	Voltage, digital number, raw mass spectra data
1	Intermediate geophysical quantities	Derived from Level 0 data using basic physical principles or calibration equations.	Concentration in ppb or ug/m3
2a*	Standard geophysical quantities	Estimate using sensor plus associated physical measurements directly related to measurement principle.	NO2 derived from O3 and Ox (O3+NO2) Temperature and humidity correction to sensor estimates. Methane and speciated air toxics peaks derived from time series data.
2b	Standard geophysical quantities, extended	Level 2a but using external data sources for artifact correction & directly related to measurement principle.	Not planned for use in the SMMI effort.
3*	Advanced geophysical quantities	Aggregated geospatial products using standard statistical methods.	Basic average concentration maps. Maps of enhancement events.
4*	Spatially continuous geophysical quantities, modeled spatio-temporal phenomenology	Aggregated geospatial products using advanced statistical models and potentially external data	Statistically reconstructed concentration maps with confidence intervals. Hotspot maps

10.2 Data management pipeline

The Data Management Pipeline includes five stages that manage data from collection to analysis. First, 1-Hz sensor data and accompanying metadata are **published** to remote (cloud) systems. Next, the sensor data and metadata are **ingested** into Aclima cloud storage. This Level 0 data is archived to ensure it is never altered. PML data is processed separately but in compatible formats. The raw, Level 0 data is **transformed** into calibrated physical quantities (Level 1) and further refined standard measurements (Level 2a), applying necessary corrections, time-shifting adjustments for sensor lag, and performing both automated and manual data quality flagging. Next, the **models** are used to aggregate L1/L2a information into higher-level geospatial data products (Level 3 using standard statistical methods and Level 4 employing advanced modeling techniques) to identify emission sources and disproportionately affected areas. Lastly, the data in all levels are labeled and **stored** using scalable cloud data storage. The original collected data is always preserved and snapshots are taken at critical states. CARB will have access for a three month period post-contract.

10.3 Data review and quality assurance

The data management system incorporates support for data review checks, defined as the manual or automated flagging of automated signals from sensor time series. Scientific details of data review can be found in the Appendices C, D, E, and F. Different data review and QA activities take place at different stages.

During the active deployment of a monitoring device and as data is streaming to the cloud, the monitoring team periodically checks (through a combination of manual and automated processes) the data being ingested to flag any sensor or data quality issues as they arise. Wherever possible, issues are resolved quickly in the field. Data that must be omitted from use for any reason (e.g. leaks, sensor failure, flow blockage, etc) is flagged.

After the deployment of a monitoring device is over (once the device returns to its home base), the monitoring team conducts a full review of all sensor data collected during that device's deployment, to ensure any issues that may have slipped through the cracks during the deployment period are detected before data is finally verified. Once again, any well-characterized data issues are flagged and any omissions from use are marked.

Once the deployment of all monitoring devices in the fleet is over (once all devices return to home base and the monitoring period is over), all collected data is re-processed to take account of flags and omissions and to prepare data for handing over to CARB and the community.

The original data coming from the sensors is always preserved, as well as all annotations from the various review and QA steps, so that the inclusion or omission of specific data can be properly traced.

10.4 Data transfer

Finalized L2a data will be transferred to CARB via secure cloud storage, following a defined schema compatible with EPA's AQS where applicable. File formatting and delivery cadence are specified in Appendix F.

10.5 Data visualization

Data will be used to create datasets and visualizations (e.g., Esri StoryMaps) focused on identifying pollution sources and areas of disproportionate impact, with templates and specific data layers described. Aclima will develop these but CARB will own and host the final StoryMaps.

11. Work plan for conducting field measurements

The plan must describe field procedures that will be followed by those conducting measurements and provide the timeline for community air monitoring. Field procedures spell out individual tasks with enough detail so that air district staff or community members with the necessary training can complete the tasks. Examples of specific field procedures include documenting actions in logbooks, completing chain of custody forms, and conducting specific quality control procedures. The timeline needs to establish the duration of field measurements and denote milestones for completing key tasks. The plan will also describe communication and coordination steps to ensure field personnel know whom to contact for questions and how work products are delivered. Relevant safety considerations should also be documented.

The work plan for field measurements is distinguished by the monitoring approach.

11.1 Broad area monitoring

11.1.1 Field materials and procedures

Broad area monitoring principally involves the Aclima fleet (Aclima Mobile Platforms, or AMPs). Each vehicle is operated by an Aclima employee, who begins their shift at a local hub powering up instruments, a safety check, and troubleshooting. Their driving day is managed by a mobile application in their vehicle and includes mandated breaks. The day ends back at the facility and a shutdown routine.

During the day, each AMP is active on a route, constantly collecting data at 1 second intervals

11.1.2 Communication and coordination

The operations team uses a range of software applications for communication, fleet management, safety, and navigation:

- Information for each operator starting their shift is communicated via a messaging application.
- Each operator can access online resources (written and video instructions) that describe specific standard operating procedures and provide resources for a range of encountered situations.
- Any photos or notes that the operator takes during the day are captured via a dedicated fleet management application.
- A sensor/instrument interface gives basic information to the operator on data reporting status.
- A dashboard mapping application loads the monitoring plan for the day and provides guidance on the route the operator must follow
- For general communication, a dispatch phone line is maintained.
- Operators can also file tickets for issues that cannot be immediately resolved.
- Safety training and issues are handled via a dedicated platform.

11.1.3 Timeline: duration, frequency, milestones, and deadlines

Broad area monitoring will be conducted by Aclima mobile platforms (AMPs) from June 2025 through the end of February 2026, for a total of approximately nine months of monitoring.

11.2 Targeted area monitoring

In addition to the Broad Area Monitoring, the following section details the work plan for Targeted area monitoring that will be conducted in West Stanislaus County.

11.2.1 Field materials and procedures

The Berkeley van, always operated by a Berkeley affiliate alongside a co-pilot/navigator, starts at either the UC Berkeley campus or, when necessary, a predetermined external location close to the intended sampling area(s). Driving days begin with safety checks, instrument and server inspection, troubleshooting where necessary, and calibrations when appropriate. A target area and time are predetermined before each day's drive. The day ends back at the starting location, and post-drive safety, troubleshooting, and data checks are followed, as well as calibration procedures when appropriate.

The van records data at 1 second intervals, both when actively deployed and when it is at rest. In rare cases, the van may be used for limited stationary monitoring in certain locations and situations, and data from the stationary periods will be reported. Otherwise, monitoring data from drive days is automatically prepared for reporting, and stationary data is available upon request.

11.2.2 Field communication and coordination

Before and after operation, coordination and communication of monitoring activities are performed primarily via in-person meetings between the van's team (operators and co-pilots) and key project personnel. Throughout operation, management, safety, and navigation needs are addressed through a variety of procedures:

- Each team member has access to online, cloud-based resources that include specific standard operating procedures and resources for resolving a range of common situations.
- Navigation is handled primarily by the co-pilot directing the operator based on continuous feedback from the data systems. Instrument data is plotted on a map in real-time, allowing for simultaneous hotspot identification and tracking of previously driven roads.
- During each drive, the co-pilot takes notes which are automatically saved to a cloud drive.
- A dashcam is set up in the van which saves photos locally. The SD card is backed up to a cloud drive manually after every drive.
- A web-based interface gives real-time information to the van operators on instrument status and measured pollutant concentrations.
- When the van is operating, an on-call senior scientist is always available in Berkeley for safety, coordination, troubleshooting, and other assistance. On-call team members have near real-time access to the web-based interface to remotely monitor progress and aid in troubleshooting.
- Prior to conducting monitoring, the Berkeley PML team will meet with project representatives from Valley Improvement Projects in order to gain a proper understanding of the local context around the air quality concerns specified in the CAMP for targeted area monitoring. Communication channels may also be established during this meeting in order to provide real-time updates from community members about current air quality conditions or expected events that may impact air quality during the monitoring period.

11.2.3 Timeline: duration, frequency, milestones, and deadlines

Targeted area monitoring will be conducted in West Stanislaus County for a duration of approximately 1 week over a time period to be determined between June 2025 - February 2026. See Section 8.3 for details on the duration and frequency of monitoring.

How will data be used to take action?

12. Evaluating effectiveness

The monitoring work plan and data will be evaluated across all stages of the monitoring phase of SMMI to ensure that air monitoring objectives are being met. These evaluations include on-going processes during monitoring,data review while collection is ongoing, and at data verification at the end of the monitoring period after all data has been collected. For additional details on these processes, see our detailed QA documentation in Appendices C, D, E, and G.

12.1 Evaluating effectiveness during the monitoring period:

Effectiveness will be continuously evaluated during the active data collection phase to ensure the monitoring is progressing as planned and that potential issues are identified and addressed promptly. This ongoing evaluation will involve several key components:

- **Manual Data Review:** Aclima staff will conduct weekly assessments of vehicle and sensor performance, as well as overall data quality. These reviews consist of visual review of time series data from all sensors on each deployed vehicle, responding to automated alerts for specific known patterns of device issues (e.g. sample line leaks) and addressing through corrective actions as needed, and a review of other associated diagnostic data. The Berkeley PML team conducts manual data review using an approach outlined in Appendix G.

- **Automated Data Quality Checks:** The data processing pipeline includes automatic status indicator flags that signal when measurements fall outside predefined environmental or physical specifications for the sensors. These flags serve as immediate alerts for potential sensor malfunctions, data anomalies (e.g., negative values or concentrations outside the sensor's range), or issues with supporting systems like flow rates. These checks occur as data streams through the data processing pipeline, in near real-time.

- **Contextual Data Review:** Where available, data from regulatory monitoring sites within the mapping area will be used to provide context for large-scale air quality trends over time. This allows for a comparison of Aclima's sensor data with established networks, helping to identify whether observed patterns are consistent with broader trends or potentially indicative of issues with Aclima's measurements. Factors such as distance between mobile and stationary measurements, road type, site type, and temporal aggregation will be considered during these comparisons. These evaluations occur on a weekly basis as part of the manual review process.

- **Measurement Quality Objectives:** Acceptable quantitative criteria for data quality indicators at the individual sensors (e.g., precision and bias) will serve as benchmarks for evaluating effectiveness. These are referred to as calibration acceptance criteria in our detailed Quality Assurance document (Appendix C) In addition to calibration prior to the start of monitoring, all AMNs will receive calibration checks (and subsequent recalibrations) on a 6-8 week basis over the 9 month monitoring period, including at the end of monitoring. The Berkeley PML team will evaluate their QA checks according to acceptance criteria detailed in Appendix G.

- **Data Verification:** A thorough data verification process will be conducted on an ongoing basis throughout the monitoring period in order to produce finalized data in monthly increments with a 3 month lag time. The data verification process consists of 1) a manual data review process, 2) a review of calibration results, 3) the application (where necessary) of adjusted calibration parameters and data quality flags for data reprocessing, and 4) a final review of the reprocessed data with applied calibration adjustments and data quality flags. During this process, all of the above data quality checks described above are re-evaluated just prior to and immediately after any reprocessing of data occurs. This is the final stage before data is finalized and will occur in monthly increments no more than 3 months after the data is collected. The Berkeley PML team conducts a similar data verification process as Aclima and on the same delivery cadence; specifics are outlined in Appendix G.

- **Evaluating Broad Area Monitoring Completeness:** Aclima mobile monitoring campaigns are designed to repeatedly drive roads in a monitoring area such that the roads are visited 20 times on average. An automated drive planning system evaluates the amount of driving coverage throughout a region on a daily basis and directs drivers to prioritize visiting roads in relatively underdriven regions. Additionally, Aclima analysts continuously monitor temporal and spatial driving coverage in the event that manual drive routing is needed to prevent regions with unexpectedly low numbers of visits. This is tracked by measuring the average number of measurements on each road by census block group.

- **Evaluating Targeted Area Monitoring Completeness:** The PML team will evaluate the completeness and representativeness in a way that is appropriate and responsive to the targeted area study conducted. In San Jose, the approach is a general survey of areas in the vicinity of community concerns and known sources. The number of repeat passes will be analysed along with pass-to-pass variability by scientists in charge of the data collection to evaluate the completeness of monitoring.

12.2 Evaluating effectiveness at the end of the Monitoring Period:

A comprehensive evaluation of the overall effectiveness of the community air monitoring initiative will be conducted at the conclusion of the data collection and verification phases. This final evaluation will be documented in the SMMI final report and will provide an overall assessment of the uncertainty associated with the collected data and derived data products. This will encompass various sources of error, including intra-network variability (uncertainty between different monitoring platforms), inter-network comparability (comparison with other monitoring networks, such as regulatory sites), sensor specific measurement errors, and modeling and sampling errors.

- **Comparison with External Data:** The report will include comparisons between Aclima's measurements and data from regulatory stationary monitoring sites. These comparisons will evaluate the accuracy and precision of Aclima's mobile measurements against established reference methods over various timescales. Metrics such as Mean Bias Error (MBE), Mean Absolute Error (MAE), and R^2 will be used to quantify the agreement between the datasets. Additionally, comparisons of the modeled ambient concentration estimates with annual averages from nearby regulatory monitors will be included to assess the overall performance of the data products

- **Aclima and PML Calibration Results:**. Results from the calibration events conducted on Aclima's Mobile Nodes (AMNs) and the PML team, both before, during, and after their deployment. These results will help characterize the typical measurement error at the device level by comparing sensor readings to reference instruments and amongst themselves.

- **Stationary Comparison with Regulatory data:**. This evaluation will compare data from Aclima's stationary AMNs, collocated at regulatory monitoring sites, with the measurements from those regulatory monitors. This comparison will help determine the measurement error and how Aclima's data aligns with the established regulatory network's data.

- **Mobile Comparison with Regulatory data:** This analysis will involve comparing in situ measurements collected by Aclima's mobile monitoring fleet near regulatory sites with the concurrent data from those stationary sites. This will provide insight into the agreement between mobile and stationary measurements, considering both measurement errors and the natural spatial and temporal variability of pollutants. This is only relevant for Aclima’s data, not the PML data.

- **Ambient Concentration Comparison with Regulatory data:** The hyperlocal ambient concentration estimates will be compared with long term average concentrations from regulatory stationary monitors. This will help assess the overall uncertainty in Aclima's estimates, including factors like modeling and the temporal sparseness of mobile measurements. This is only relevant for Aclima’s data, not the PML data.

- **Analysis of completeness and representativeness:** Analysis will be performed to show how well distributed data collection is across times of day, days of week, and season. Additionally, the number of passes in each location will be reported. Similar analyses will be conducted in similar ways for both the targeted and broad area monitoring approaches.

12.3 End of monitoring

Monitoring ends when deployments for all vehicles (AMPs and PMLs) are complete. To determine of the appropriate time to end monitoring in support of this CAMP (within the contractual and resource constraints of the SMMI project), the monitoring team will evaluate whether:

- Monitoring coverage has exceeded the required minimum percentage coverage requirement for priority communities within the SMMI-wide monitoring areas (i.e. across all CNCs, not just West Stanislaus County)
- Data gathered is sufficiently representative of the seasonal, time of day, and day of week variation across the monitored area (i.e. not biased by data collection at one specific time), such that they can support the objectives, sub-objectives and presentation plans as uniquely defined in this monitoring plan
- Data gathered is sufficiently representative of the spatial variation in air quality across the monitored area, such that they can support the objectives, sub-objectives and presentation plans as uniquely defined in this monitoring plan

The results of all quantitative evaluations of effectiveness listed above will be included in a Quality Assurance report to accompany the final project report. Details on the above activities will be included for both Aclima and the PML teams.

13. Data analysis and interpretation

13.1 Preparation of finalized datasets

As described in Section 10 on data management (and in detail in the Data Management documentation in Appendix F), 1-second "finalized" data collected by all sensors and instruments will go through several data verification and validation protocols, and transformation steps before they are described as finalized and made available to CARB.

"Finalized" data is defined as sensor signals transformed to geophysical quantities of measurement (Level 2a), calculated using the sensor signal plus associated physical measurements directly related to the measurement principle such as temperature and relative humidity measurements. Data flagged for artifacts will also be included.

13.2 Aclima analysis, interpretation, and visualization of data

Mobile monitoring data gathered under this CAMP are intended to facilitate focused actions by communities and CARB, including any future work to identify and prioritize locations for more comprehensive community-scale air monitoring, or develop Community Emissions Reduction Programs (CERPs).

To support this potential future work, the monitoring team will generate a series of additional datasets that can help communities better understand and interpret the data in the context of the concerns detailed in this CAMP. These datasets will be in addition to the finalized 1-second finalized data provided directly to CARB and require further processing as described in Section 10 in this monitoring plan. These datasets can support identifying and characterizing sources or identifying disproportionate spatial and temporal impacts within a community.

The following is a brief description of the different possible analysis and visualization approaches used by SMMI. In some cases, the analysis approaches are matched with specific monitoring approaches, but there can be various combinations of monitoring and analysis approaches that could be selected to appropriately achieve the desired monitoring objectives.

- **Clusters of enhancement detections on a map** - Identifying locations of pollutant enhancements (high concentrations above background levels) on a map. Clustering or grouping of pollutant enhancements refers to identifying locations where multiple enhancements of the same pollutants are detected at multiple different times over the course of monitoring.
- **Statistics on enhancement detections** - Statistical values that describe how often enhancements were detected in a specific location. Examples include number of detections, the number of detections per visit, or the number of distinct days of detections.
- **Chemical speciation bar graph or pie chart** - A bar chart or pie graph that indicates the relative concentration of different key pollutants of interest in a specific location. This can represent the pollutants within an enhancement detection, averaged across an enhancement cluster (i.e. multiple enhancements in the same location), or in ambient concentrations of background air.
- **Diurnal plot of enhancement detection events** - This analysis shows the frequency of enhancement detections in a particular location by hour of day. This analysis requires balanced sampling across different times of day in the same location.
- **Ambient concentration gradients over plume transects** - Displaying ambient concentrations as they vary in space in the downwind region of an air pollution plume. This type of analysis is generally paired with the

plume transect monitoring approach, but a general survey approach may also be appropriate in certain situations.

- **Ambient concentration map of key pollutants -** Displaying a map of ambient concentrations that are generally representative over the time period that monitoring takes place. Typically the general survey monitoring method or broad area monitoring is required for this type of analysis.
- **Area-wide chemical breakdown bar graph or pie chart -** A bar graph or pie chart showing the relative proportion of different pollutant concentrations detected on overage over a particular area of covered. Typically the general survey monitoring method is most useful for this type of analysis

Some example forms of final data visualizations are shown below. These example visualizations can help address the community specific concerns in West Stanislaus County for the concerns assigned monitoring objectives in Table 5. The map of ambient concentration estimates shown in Figure 15, below, is directly responsive to the monitoring objective of identifying disproportionate impacts (e.g. traffic congestion in school areas and other mobile sources). The heat map of TVOC hotspots is responsive to the monitoring objectives of characterizing sources (e.g. Gallo Glass company). Note that broad area monitoring may result in visualizations that provide information (for example clusters of enhancements) about additional concerns not specifically assigned monitoring objectives or unknown sources not listed specifically as community concerns here.

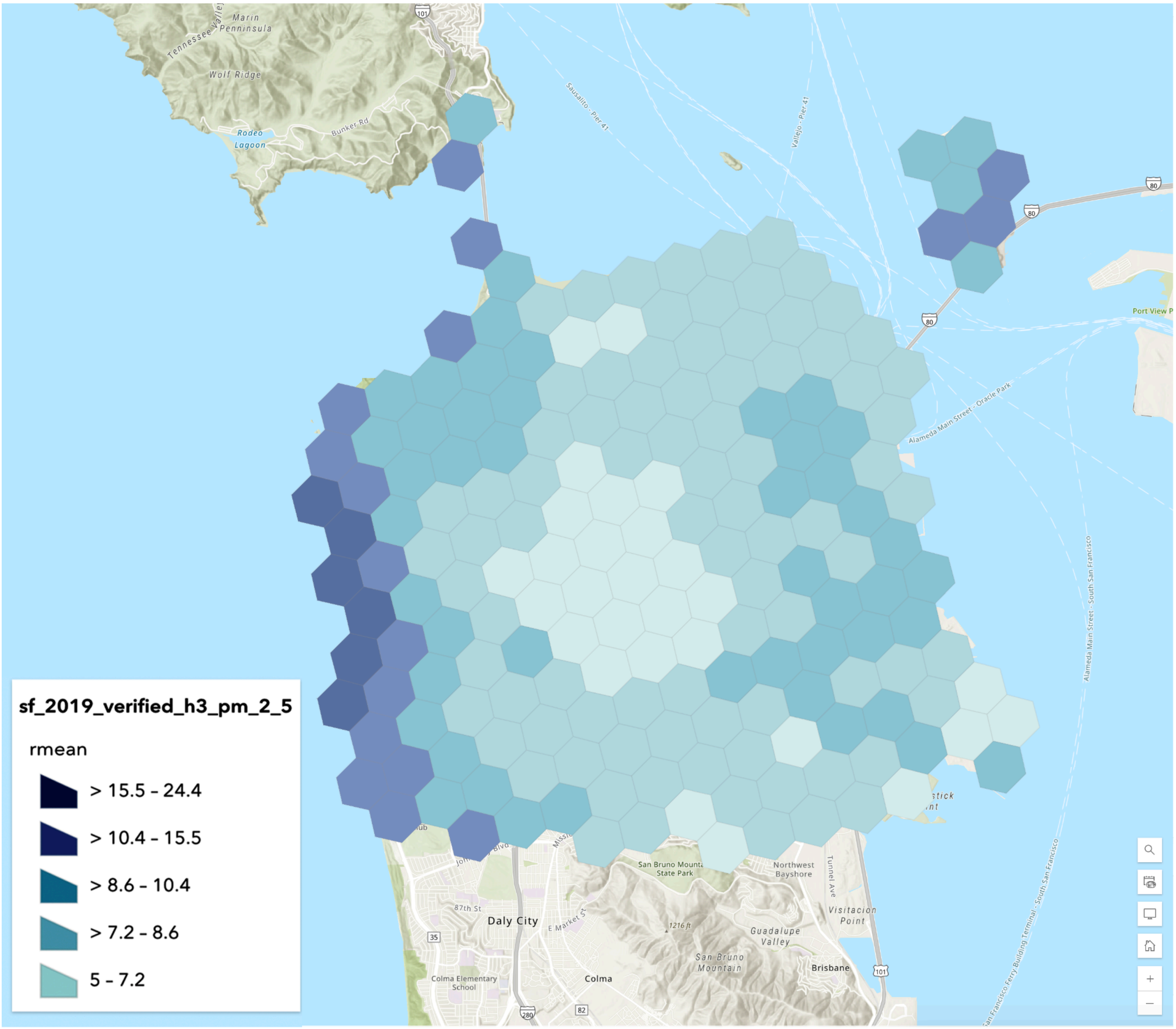

Figure 15: Example of a map of ambient concentration of $PM_{2.5}$ over a specific area plotted using hexbins. In this type of map, the color indicates pollutant concentration. In this example, colors indicate PM2.5 concentrations for data collected over a 1 year time period in San Francisco, CA. Map data © Mapbox, © OpenStreetMap.

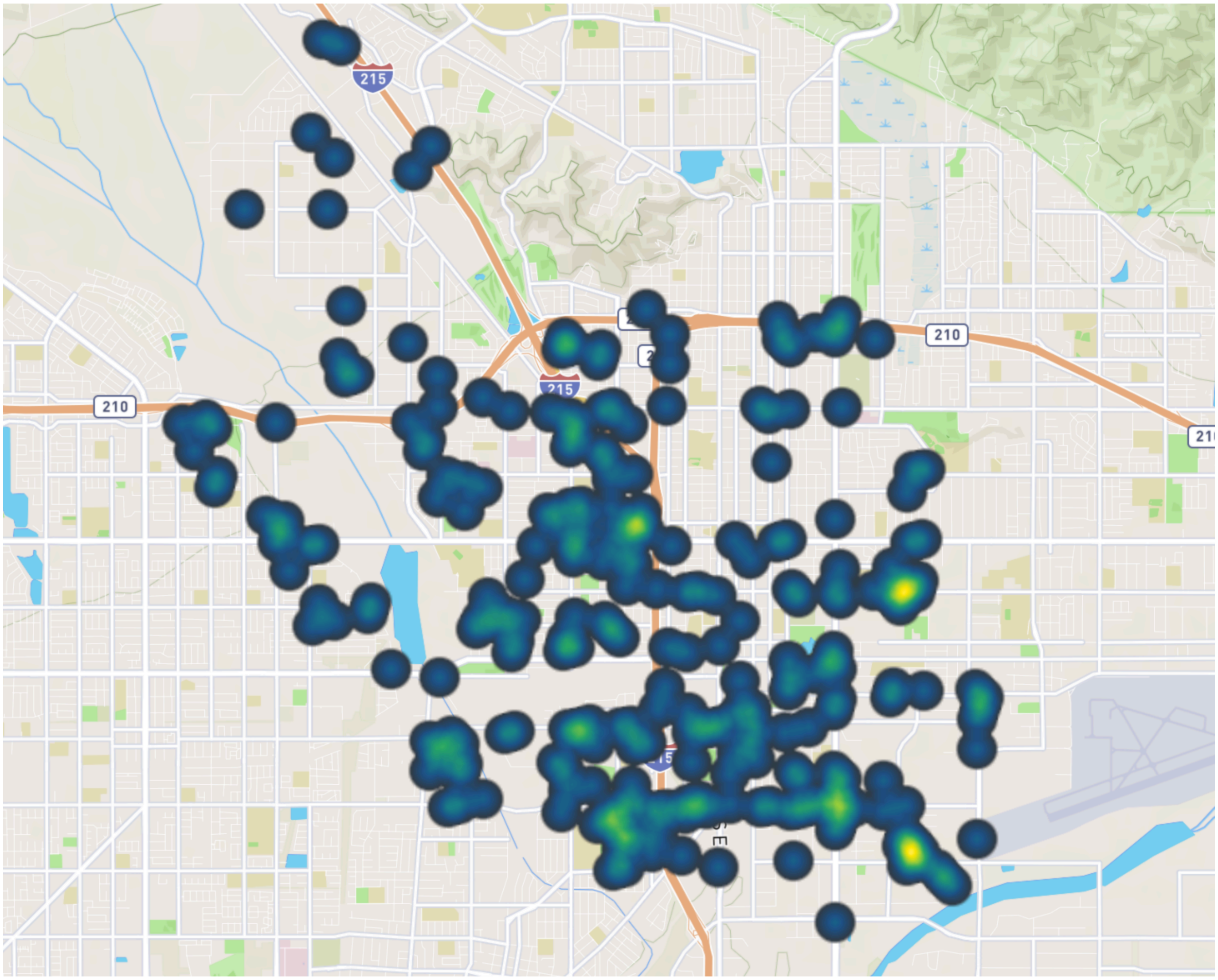

Figure 16: Example of plotting an enhancement-based dataset (TVOCs) as a heatmap. In this type of map, the density of individual enhancement events are shown, where the brighter colors indicate a higher density of detected enhancements. In this example, data collected over a 3 month period in San Bernardino, CA are shown. Map data © Mapbox, © OpenStreetMap.

For the concerns assigned specific monitoring objectives in this monitoring plan, the analysis approaches are specified in Table 5, in Section 4.3. Appendices D and E provide more detailed descriptions of how different analyses are performed and the different implementations of the approaches that are possible. The specific implementation of these approaches will be determined after the data is collected and evaluated. Data from both Aclima platforms and the UC Berkeley PML will be analyzed according to the general approaches outlined above.

14. Communication of results to support action

The mobile monitoring data collected in this community will be analyzed and presented to support focused action to reduce emissions or exposure. This requires an accessible visualization, of which Aclima has many. CARB has selected ESRI StoryMaps as their visualization platform.

The project offers Engagement Leads supplemental budgets for capacity building and relationship building to foster the partnerships necessary for translating data into emissions reduction actions.

14.1 Reporting of high concentrations prior to the end of the contract

The intent of the SMMI is not for real-time alerting. However, during data collection, there may be instances where pollutant concentrations significantly exceed expected levels. To address these situations, a response protocol has been established to ensure that such anomalies are promptly reviewed, assessed, and, where necessary, mitigated in coordination with relevant agencies and community stakeholders. If concentrations exceed thresholds defined below and that alert is deemed viable after analysis and assessment by Aclima or a Partner Mobile Lab, Aclima will inform the local Air Districts or other relevant local authorities. Not every alert will trigger a report. Only after in depth investigation by scientists in the field or remotely via data analysis will an alert event be deemed viable for reporting.

Pollutants that will be included and the assessment protocol and reporting structure are detailed in the table below.

Table 10: Pollutants that will be included and the assessment protocol and reporting structure

Pollutant	**Initial Assessment Protocol**	**Data Reporting and Communication to Local Air Districts or Other Relevant Local Authorities by Aclima**	**Community Updates**
Methane/Ethane Relevant threshold: 100 ppm methane[a]	Aclima: ● Alert Detection ○ Detection above threshold TBD ● Data Analysis ○ Validation of Measurements ○ Trend and Historical Data Assessment ○ Environmental Context Evaluation ○ Schedule repeat visits if necessary	Aclima: ● If Alert is Deemed Viable – Prepare and Submit Report: ○ Location/Time of Event ○ Historical detections in the area ○ Classification of methane source (thermogenic or biogenic) ○ Description of the local environment (land use, sources, notable features) ○ Placeholder for Summary of CARB's Findings and Next Steps ● Email the completed report to designated CARB contacts within 2-3 business days of verification	CARB: ● Monthly Summary Reports will be posted to the CARB website and will include: ○ A summary of reports generated ○ Locations and timestamps of detections ○ Results of preliminary analysis ○ Actions taken or recommended follow-up steps Aclima: ● A comprehensive summary will be included in the End-of-Campaign Report, covering:

			○ All events detected over the course of the campaign ○ Historical patterns and trends ○ Overall progress and response efforts
Toxic Air Contaminants Relevant species and thresholds[b]: ethylene oxide (5 ppm CAL/OSHA PEL-STEL), formaldehyde (2 ppm CAL/OSHA PEL-STEL), benzene (5 ppm CAL/OSHA PEL-STEL 5ppm), toluene (CAL/OSHA PEL-STEL), acrolein (0.3 ppm NIOSH STEL), and carbon monoxide (200 ppm CAL/OSHA PEL-STEL)	PMLs: Alert detection ● Detection above threshold (will refer to short term permissible exposure limit (PEL) or Recommended Exposure Limit (REL) as appropriate) Data Analysis ● Validation of Measurements ● Repeated measurements ● Environmental context evaluation	PMLs: If Alert is Deemed Viable Event after analysis and repeated monitoring: ● Air district will be notified by Aclima immediately upon verification of the event ● PMLs will prepare and submit Report within 3 days of verification: ○ Location/Time of Event ○ Pollutant and concentration ○ Historical detections in the area ○ Description of the local environment (land use, sources, notable features) Note: Reporting timelines may vary based on the instrumentation used, QA/QC protocols, and time required to validate findings.	CARB: ● Monthly Summary Reports will be posted to the CARB website and will include: ○ A summary of reports generated ○ Locations and timestamps of detections ○ Results of preliminary analysis ○ Actions taken Aclima: ● A comprehensive summary will be included in the End-of-Campaign Report, covering: ○ All events detected over the course of the campaign ○ Historical patterns and trends ○ Overall progress and response efforts

a) Threshold for methane is not based on a specific health-based action limit, but is based on historical data collected by Aclima, indicating values typically associated with large significant natural gas leaks.
b) Air toxics contaminants are those that may be measured PMLs and monitored in real time by scientists aboard the mobile platform. The thresholds are based on health action limits, however, it should be noted that these are limits only used as a benchmark to trigger follow up investigation and do not indicate that these health action limits have actually been exceeded. The event will only be reported if the scientists deem the alert to be a viable event based on their investigation. Additionally, the species detected by this method will be uncalibrated signals that may have high uncertainties (up to 50% in some cases)

14.2 Public Data Access

Upon completion of the contract, CARB will make the finalized monitoring data available for public access through the CARB AQview website. Data for each region and pollutant will be provided in standardized, comma-separated values (CSV) format to ensure broad compatibility with commonly used data analysis tools and software. This approach supports transparency, encourages independent analysis, and facilitates community and academic engagement with the air monitoring results.

14.3 Community Story Maps

Aclima will deploy the finalized raw data and appropriately-selected data analyses (described in Sections 13.2 and 13.3) in accessible online, public, interactive and free-to-use visualizations built on the Esri platform. These visualizations will be in the format of a customized platform built with Esri StoryMaps and hosted by CARB. A range of analyses are available to identify potential sources and to identify locations of disproportionate impact, drawing on data collected through both targeted area monitoring conducted by UC Berkeley and broad area monitoring conducted by Aclima.

14.4 Final Report

A final report will be delivered to CARB at the end of the contract, May 19, 2026. This report will provide a comprehensive analysis of the data collected by Aclima and the Partner Mobile Laboratories during the SMMI and will include the following sections:

Executive Summary: The report will include an executive summary to highlight the key takeaways, recommendations, or limitations of the report.

Summary and Timeline of Air Monitoring: The report will provide a summary of the air monitoring activities conducted and a timeline of when these activities took place. This will offer context and background on the project.

Discussion of Data Collection, Validation, and Analysis: The report will detail how the air quality data were collected using Aclima's mobile monitoring platforms and partner mobile laboratories. It will also explain the quality assurance and quality control (QA/QC) procedures implemented to ensure the data's integrity, including how the data were validated. Furthermore, the report will describe the methods used to analyze the collected data, potentially including analyses for identifying pollution sources and areas of disproportionate impact like diesel indications, toxic air contaminant hotspots, and natural gas leaks.

Summary of Significant Findings and Conclusions: The report will present a summary of the key findings from the air monitoring campaign. This will include ambient concentrations and any identified pollution enhancements. These findings will be presented in a manner understandable to a non-scientific audience.

Recommendations and Next Steps: Based on the findings, the report will offer recommendations for potential next steps. This may include suggestions for tracking progress or verifying results achieved by community emissions reduction programs, or for future, more comprehensive monitoring efforts.

Dissemination Plan: The report will outline how the data and the findings will be disseminated and discussed with appropriate decision-makers so that the information can lead to the intended actions for emissions reduction and public health improvement. This will include the use of publicly accessible data visualizations such as ESRI Storymaps. The report will also mention the virtual public meeting organized to explain project results and discuss possible next steps.

Public Meeting: To better help community members understand the content of the final report in an accessible manner, Aclima and California Air Resources Board staff will organize online meetings by air district (or sub-group within air district if necessary) to explain project results, answer questions, have community members share their experiences engaging with the project, and discuss possible next steps. Valley Improvement Projects will play a major role in outreach and promoting community attendance at this meeting. This meeting will be conducted in English with Spanish interpretation and designated Spanish breakout rooms. To ensure further accessibility to results, Aclima will provide one-page result summaries for each community in both English and Spanish that Valley Improvement Projects can distribute physically or via Whatsapp or text.

Input from Stakeholders: The final technical report will incorporate input from stakeholders across the initiative, including the Project Expert Group, community representatives, air quality officers, and environmental justice leaders.

Accessibility: Aclima will consider accessibility needs for the print document, such as alt text and color design.

The report will be provided to CARB in both PDF and the original electronic format.

Appendices

Full appendices are available here: https://aclima.earth/smmi-camp-appendices

- Appendix A: SMMI Community Engagement Plan (CEP)
- Appendix B: SMMI Community Mileage Allocation
- Appendix C: Aclima Quality Assurance System
- Appendix D: Aclima Hyperlocal Ambient Concentration Estimate Validation and Quality Assurance System
- Appendix E: Aclima Hyperlocal Enhancement-based Data Products Quality Assurance System
- Appendix F: Aclima Data Management Plan
- Appendix G: Partner Mobile Laboratory Quality Assurance Project Plan (QAPPs) and Data Management Plans
- Appendix H: Approach for Assigning Targeted Area Studies
- Appendix I: Complete Table of Pollutants and Instrumentation
- Appendix J: Public Comment and Response Documentation
- Appendix K: Community Meeting Evaluations