Greater Oakland

Community Air Monitoring Plan

California Statewide Mobile Monitoring Initiative (SMMI)

June 2025

Prepared by Aclima, Inc.

in partnership with HOPE Collaborative and the SMMI Project Expert Group

California Climate Investments — Cap and Trade Dollars at Work

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 Greater Oakland 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 comprehensive sharing of relevant knowledge and information and collaboration with all interested community stakeholders to address local needs and will create a data portal for the public to access and review the collected data.

Contents

List of Abbreviations Used in the Community Air Monitoring Plan

Abbreviations	Term
AMN	Aclima Mobile Node
AMPs	Aclima Mobile Platforms
AQS	Air Quality System
BART	Bay Area Rapid Transit
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
LCERP	Local Community Emissions Reduction Plan

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
WOEIP	West Oakland Environmental Indicators Project

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 comprehensive sharing of relevant knowledge and information and collaboration with all interested community stakeholders to address local needs.

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.

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. Aclima has consulted with the PEG to direct engagement, monitoring, and outreach activities and received recommendations, advice, feedback, and concerns during CAMP development. The Community Engagement Plan itself was developed in collaboration with the Project Expert Group.

Aclima's Project Team: This team has monitored local engagement strategies and supported Engagement Leads by offering technical expertise, data interpretation, outreach materials, and meeting support.

Table 1: Project teams and contact details

Organization/team	Contact details
CARB	smmi@arb.ca.gov
Aclima	carb-team@aclima.earth
Project Expert Group	carb-team@aclima.earth
Engagement Leads	janina@hopecollaborative.net

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.

The monitoring aims to identify and characterize areas experiencing disproportionate air pollution impacts as well as specific air pollutant emission sources. By soliciting resident and other interested parties' knowledge through community meetings and surveys, the project seeks 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 Community profile

Demographic characteristics

Greater Oakland is a large and diverse collection of neighborhoods. The Oakland flatlands and the Oakland hills have varying demographics and socioeconomic differences. Table 2 illustrates these differences using information found on CalEnviroScreen, showing the neighborhoods ranking with the 100th percentile representing the maximum value of the dataset. The data in Table 2 clearly show that residents in Central Oakland experience significantly higher poverty rates and have lower educational achievement. Central Oakland in this case refers to Downtown, Chinatown, and other communities surrounding Lake Merritt, and the region that the monitoring planning process is designed for.

Table 2: CalEnviroScreen demographics for Oakland neighborhoods

Flatlands Neighborhood	Race	Poverty	Age (% ages 10-64 years old)	Prodominate Language	Education

Chinatown	83% Asian American	87th	55%	Cantonese, English	89th
Jack London	52% White, 24% Asian American	12th	85%	English	n/a
Downtown/Old Oakland	38% Black, 28% White	77th	75%	English	53th
Laney-Peralta	52% Asian American, 26% White	70th	75%	Unknown	67th
Clinton	35% Asian American, 22% Hispanic, 20% White	63th	79%	Unknown	65th
Oakland Hills Neighborhood	**Race**	**Poverty**	**Age**	**Prodominate Language**	**Education**
Joaquin Miller Park region	69% White, 15% Black	10th	65%	English	5th
Leona Heights/ Leona Canyon	40% White, 23% Black	15th	68%	English	20th
Claremont Canyon	74% White, 12% Asian American	11th	66%	English	13th

Health trends

The residents of greater Oakland experience very different health outcomes. Residents in the hills have a life expectancy 7-10 years higher than flatland residents in West, Central, and East Oakland. Emission and pollution rates are much more prevalent in the flatlands and therefore there are more health impacts in this region. Oakland currently has some of the highest rates of asthma in all of Alameda County. Below is a chart populated with health data from CalEnviroScreen showing the neighborhoods ranking with the 100th percentile representing the maximum value of the data set. The data in Table 3 clearly show that residents in Central Oakland experience higher asthma rates than the residents in the Oakland Hills, as well as higher incidence of low birth weight and cardiovascular disease. Oakland, in general, has some of the highest rates of asthma in Alameda County, impacting children and elderly residents. Long term exposure to pollutants heighten risk of cardiovascular diseases, cancer, and respiratory illnesses. Pollution exposure is one factor in the lower life expectancy in residents living in Oakland's flatlands.

Table 3: CalEnviroScreen health data for Oakland neighborhoods

Flatlands Neighborhood	Asthma Rates	Cardiovascular Disease	Low Birth Weight

Chinatown	96	37	91
Jack London	99	54	68
Downtown/Old Oakland	96	39	52
Laney-Peralta	99	51	41
Clinton	92	32	59
Oakland Hills Neighborhood	**Asthma Rates**	**Cardiovascular Disease**	**Low Birth Weight**
Joaquin Miller Park region	32	11	2
Leona Heights/ Leona Canyon	88	22	45
Claremont Canyon	4	1	23

2.2 Objectives and approaches in community air monitoring

The purpose of community air monitoring is to collect air pollution data across communities for both short- and long-term air quality assessment and to support actions within those communities to reduce emissions and/or exposure.

Community air monitoring generally falls into two types, with different functions:

1. Ambient air quality monitoring, where ambient air is sampled so that its status can be evaluated against existing standards and historical information.
2. Stationary source monitoring, where air quality measurements are made in the area near individual stationary sources (e.g. industrial facilities) so that a stationary source's emissions can be characterized and its potential impact on local communities can be assessed.

Data collected through community air monitoring - whether focusing on ambient air quality or stationary sources - can be compared with levels measured previously, against regulatory standards and health benchmarks, and placed in context of prior monitoring and health impact studies. Comparisons and analyses of this nature can provide the basis for additional regulatory action, including, but not limited to, additional monitoring, enforcement actions, and other emissions and/or exposure reduction efforts.

A number of measurement approaches can support community air monitoring, primarily the placement of stationary instruments or sensors in strategic locations throughout the community or by using instruments or sensors mounted on one or more moving vehicles. This CAMP utilizes mobile monitoring methods as outlined by CARBs Statewide Mobile Monitoring Initiative.

All efforts to track air quality aim to pinpoint the origins of specific air contaminants and the regions they impact. However, mobile monitoring uses different methods compared to more common stationary monitoring. Stationary monitors collect very frequent data over time, but their high cost and the difficulties of setting them up and running them mean that only a limited number can be placed within a community. This results in ongoing measurements at just a few spots. Notably, equipment for tracking toxic air pollutants tends to be more expensive and needs specialized personnel to operate, significantly restricting the use of stationary monitoring for these substances.

Mobile monitoring offers a versatile approach, enabling the measurement of changes in air pollutant levels across different locations in great detail. However, it provides less continuous data for any single spot over time. 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. Furthermore, by putting equipment for detecting toxic air pollutants on vehicles, a larger area can be monitored for these harmful substances. 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.

2.3 Community-specific motivations for air monitoring

Transportation is one of the largest emissions sources in Oakland. Though there are many alternative modes of transportation, many people drive and The Port of Oakland is an important part of the city economy, which results in the transportation of goods via diesel trucks. A large percentage of pollution that can be found throughout the city is Particulate Matter 2.5 (PM 2.5) from diesel exhaust. This is predominantly found in neighborhoods situated close to the Interstate 880 freeway, as diesel trucks are banned from traveling via Interstate 580. Broadway is a major thoroughfare, also known as Auto Row, that travels from Jack London up to North Oakland, cutting through a majority of the central part of the city. This is another source of vehicular traffic and emissions. Other sources of pollution include the Dynegy Oakland Power Plant, Amtrak railways, motor boats on Lake Merritt and the surrounding bay, construction throughout the City, and major events such as wildfires. These sites are sources of pollutants, including Black Carbon, NO, NOx, CO, CO2, and PM 2.5.

In the Greater Oakland region there are not many groups, known individuals, or community organizations focusing on air quality advocacy. Many of these advocacy efforts are rooted in West and East Oakland as they experience the biggest pollution burden as well as other historical systemic oppression policies that impact other social determinants of health. There is growing concern about major air quality events, such as wildfires, that have made a lasting impact on residents and proved a need for air filters and clean air spaces. However, there are environmental justice and community groups throughout Greater Oakland working on other issues of importance to the community. Resilience hubs and resilient upgrades to community centers can be seen in Chinatown through Asian Pacific Environmental Network and The City of Oakland. The resiliency hub effort is ongoing and has City department staff dedicated to this work. Many groups work on illegal dumping and water quality at Lake Merritt including Lake Merritt Institute and The City of Oakland's Clean Lake Initiative. There are also various neighborhood improvement councils and community groups working on safe and clean streets such as the Oakland Chinatown Coalition, Uptown and Downtown Community Benefits District. Previously, there was an active Oakland Climate Action Coalition that worked citywide on various issues such as Just Transition, climate education, and grassroots organizing campaigns. This group has been dormant since 2020.

There are no known recent air quality monitoring efforts in the Greater Oakland community being managed by community members or community organizations. There are records of air quality measurements within the last two decades around Lake Merritt and Jack London Square. Many recent air quality measurements are related to project permits such as environmental impact reports. There is a network of Purple Air monitors within the Greater Oakland community but this does not appear to be due to a coordinated effort. Most air monitoring efforts have taken place in West Oakland through the leadership of the West Oakland Environmental Indicators Project (WOEIP). Though West Oakland has defined borders, some communities within Greater Oakland have had air monitoring projects due to the neighborhood's proximity to West Oakland. For example, the Environmental Defense Fund worked with the WOEIP to map out Black Carbon, NO, and NO2 in West Oakland and Downtown, Uptown, Chinatown, Jack London Square neighborhoods. Aclima has done air quality monitoring in the greater Bay Area including Oakland through projects such as Air.Health.

These monitoring efforts have revealed the impact that transportation has on Greater Oakland's air quality. The biggest emission sites continue to the freeways and roadways, notably Interstate 880 as it is the main route for diesel fueled trucks transporting goods from The Port of Oakland.

The Greater Oakland community and its neighborhood regions do not have a current emissions reduction plan. The individual communities within Greater Oakland are lacking in a coordinated, community based effort to address emissions reductions. The City of Oakland previously created a GHG reduction plan within the 2017 Energy and Climate Action Plan. The City of Oakland also produced an Equitable Climate Action Plan 2030 and an Environmental Justice element to the 2045 General Plan. Various tasks regarding the carbon removal with the Equitable Climate Action Plan have a timeline of being completed in 2025. The Environmental Justice element has been adopted into the General Plan but efforts to address policies regarding emissions reductions on the citywide level do not seem to have begun. For all of the City plans, contributions from community members, environmental justice organizations, and community organizations supported the final plan.

Other specific concerns identified through community engagement are included in the table 4 below.

Table 4: Specific concerns identified through community engagement

Location and Concern	**Details**
Lake Merritt BART Station	Lake Merritt BART Station was identified as a site for concern due to dust and debris from concrete and other construction materials. The City of Oakland was mentioned as the likely responsible party for this pollution
Webster Tunnel/ Webster Tube	The Webster Tunnel/Webster Tube was another area highlighted, with car exhaust and CO being the primary pollutants of concern
Interstate 880 Freeway	The Interstate 880 Freeway, which cuts through West Oakland to East Oakland, impacting Chinatown, Downtown, Peralta-Laney, and Clinton neighborhoods, raised concerns about car exhaust, CO, and PM 2.5. This was attributed to general vehicular traffic and diesel trucks transporting goods via the 880 freeway from the Port of Oakland, as well as a large amount of vehicular traffic from residents moving through the City. The pollution was noted as being constant

Lake Merritt	Finally, Lake Merritt was mentioned due to odors from personal vehicles, buses, and motorcycles, along with other smells mostly related to the water quality of the Lake. Public transportation was identified as a source of the vehicle-related odors.
Airport (Oakland Airport) (Lat/Lon: 37.719078, -122.221326)	Concerns include the impact of leaded fuel and jet fuel , and concern about potential expansion .
Port (Port of Oakland) (Lat/Lon: 37.797655, -122.31183)	No additional details provided.
Area with Distribution/Warehouse Facilities and Truck Traffic (Lat/Lon: 37.773586, -122.21674)	Concerns include the presence of many unmarked businesses near homes, the need for transparency regarding owners and business types, limitations on heavy duty vehicles, the unpleasant experience of walking behind big idling trucks (especially in the Fruitvale business district area), and questioning whether facilities are in compliance with current air quality and pollution controls
Roadway (Freeway) (Lat/Lon: 37.747466, -122.202704)	Big trucks and cars driving past causing air pollution
Roadways (General) (Lat/Lon: 37.828149, -122.264982)	No additional details provided.

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 SMMI mobile air monitoring aims to support 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

4.2 Define mobile monitoring methods to support objectives

This CAMP defines mobile monitoring method first as either **broad area monitoring** or **targeted area monitoring**.

Broad area monitoring: monitoring vehicles collect data within the entire CAMP monitoring area over an extended time period. 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.

Figure 1: Example of plotted ambient concentration estimates for NO_2 in the San Francisco Bay Area, CA. This plot uses data generated by the broad area monitoring method.

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. 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.

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

- *Fenceline* driving (Figure 2) 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 2) 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

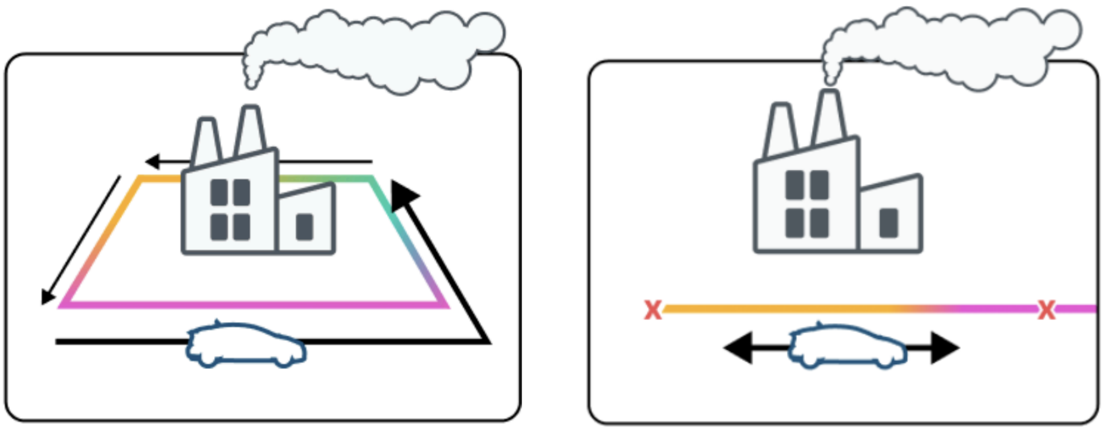

Figure 2: Example measurement technique for targeted area monitoring using (left) fenceline driving systematically surveys around the perimeter of a known or suspected source facility/site and (right) transect driving following a path designed to sample upwind, in, and downwind of a potential plume of pollution from a known or potential source.

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.

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
Interstate 880 Freeway	Disproportionate Impacts	Pollutant levels Key pollutants	Targeted area: General survey	Clusters of enhancement detections on a map

		Spatial Distribution Locations Impacted Time of Day		Statistics on detections Diurnal plot of detection events
Webster Tunnel/ Webster Tube	Disproportionate Impacts	Pollutant levels Key pollutants	Broad Area Monitoring	Clusters of enhancement detections on a map
Lake Merritt	Disproportionate Impacts	Pollutant levels Spatial Distribution	Broad Area Monitoring	Clusters of enhancement detections on a map
Airport (Oakland Airport)	Characterizing Sources	Locations Impacted Pollutant levels	Broad Area Monitoring	Clusters of enhancement detections on a map
Roadway (Freeway)	Disproportionate Impacts	Locations Impacted Pollutant levels	Broad Area Monitoring	Clusters of enhancement detections on a map

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 3), a list of community organizations that are Engagement Leads, and a list of the PEG members (Figure 4).

Aclima is responsible for community engagement, deploying mobile platforms to collect data, managing and analyzing data, and developing public reports. Engagement Leads are responsible for designing and implementing engagement strategies, conducting outreach, and working with Aclima to translate community knowledge into CAMPs. They will organize and lead community meetings. Community members play a crucial role in providing their knowledge and experiences to shape the CAMPs through surveys and participation in meetings. They are also compensated for their time and contributions. The Project Expert Group guides community engagement and decision-making throughout the project. CARB funds and oversees the project. Local air district representatives are also engaged to offer technical and contextual knowledge.

SMMI Partners

Figure 3: 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 4: 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 precision, bias, or limit of detection. Additional information on these and other data quality indicators can be found in Appendices C, D, E, 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, toxic air contaminants

   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, toxic air contaminants

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.

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
- **Targeted area monitoring** for investigations of specific sources and areas of concern, collected by AMPs and PMLs, 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 5).

Figure 5: 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 across all times of day and 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.

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 Greater Oakland is shown in Section 8: Monitoring Areas.

7.3 Monitoring methods - targeted area monitoring

Aclima and its research partners 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 Greater Oakland.

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

Aclima can map a finite number of road miles (approximately 12,000 miles of road length) to collect sufficient repeat measurements necessary to characterize representative pollutant concentrations over the nine month monitoring period. 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 each of the 5 air districts containing the 64 CNCs (Imperial County, South Coast, San Joaquin Valley, Sacramento Metro, and Bay Area). 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 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 (CES) score, addressing concerns raised by the PEG about the relevance of many of the metrics used in CalEnviroScreen as applied to the SMMI. 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 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 certain census tracts being prioritized within CNCs, the Engagement Leads were able to work with communities directly to use the road mileage budgeted for those communities to select monitoring boundaries according to the priorities for monitoring indicated by the communities.

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 Engagement Leads.

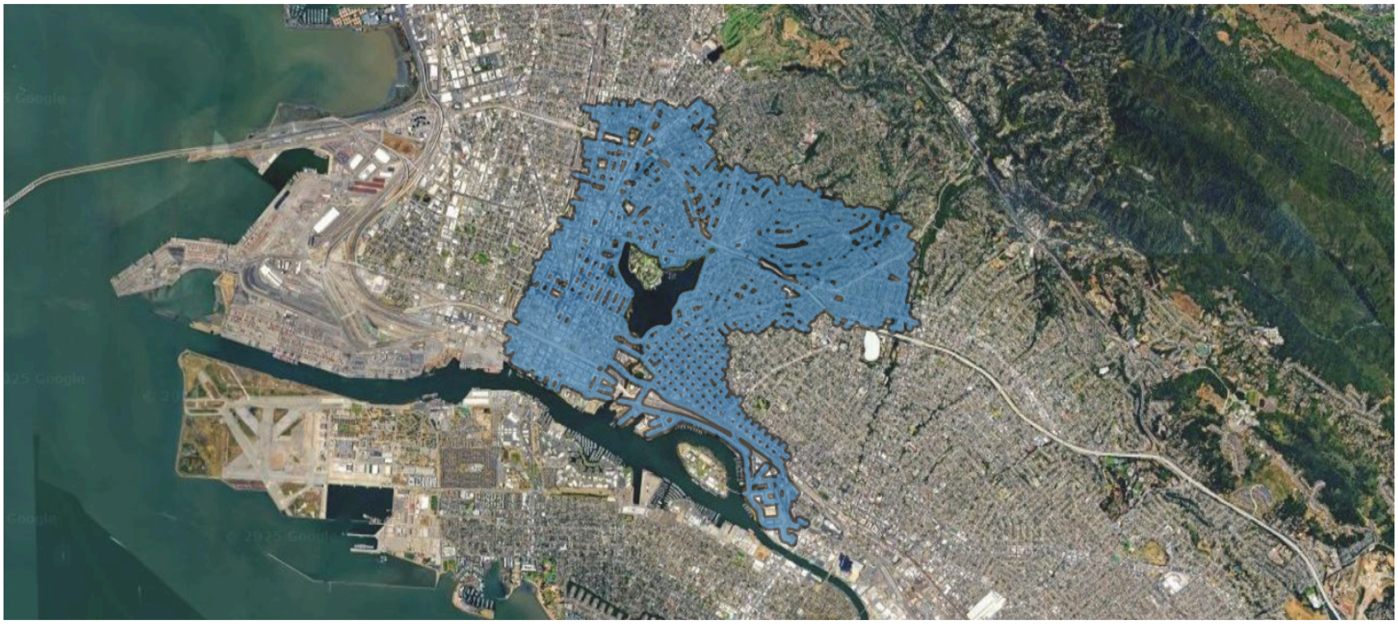

Figure 6: Map of the area for mobile monitoring in Hayward. Map data ©2025 Google.

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 the PMLs, 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 Greater Oakland will be conducted by Berkeley Mobile Monitoring Lab and will address the community identified concern about pollution from general vehicular traffic and diesel trucks transporting goods via the 880 freeway from the Port of Oakland as well as the generally impacted area including Chinatown, Downtown, Peralta-Laney, and Clinton neighborhoods.. 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 key pollutants that will be of focus include TVOC, Methane/Ethane, air toxic, odorous 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 map below shows the focus area for this targeted area study.

Figure 7: Map showing general area for the targeted area study. Actual drive plan and extent of monitoring is to be determined. Map data © OpenStreetMap © Stadia Maps, CNES, Airbus DS, PlanetObserver (cont. Copernicus Data).

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
Calibration checks	Every 6-8 weeks
Manual data review	Weekly
Driver system checks (PM zeros, data connectivity, tubing and cable checks)	Daily
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.

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

Each of the research teams operating the Partner Mobile Laboratories have developed detailed quality control procedures designed to ensure that the data collected meet the data quality standards necessary to support the monitoring objectives. The quality assurance and quality control procedures are unique to each PML. However, the processes and procedures developed by the PMLs share these fundamental elements:

- Data quality objectives
- Descriptions of the calibration processes for each instrument before, during, and after data collection.
- In-field maintenance and quality checks of the equipment while monitoring is ongoing.
- Detailed descriptions of data processing, data review, and data flagging for each instrument.
- Record keeping practices for all quality control activities.

A full description of these procedures are included in an accompanying document in Appendix G for the three PMLs.

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 8: 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, ram 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.

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 Greater Oakland.

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 HOPE Collaborative 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 Greater Oakland for a duration of approximately 1 week over a time period to be determined between June 2025 - February 2026.

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, and E.

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.
- **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 recalibrations on a ~3 month basis over the 9 month monitoring period, including at the end of monitoring.
- **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.

- **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.

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 Calibration Results**. Results from the calibration events conducted on Aclima's Mobile Nodes (AMNs), both before 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.
- **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.

- **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.

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 this plan's monitoring area
- Data gathered is sufficiently representative of the seasonal, time of day, and day of week variation across the monitored area, 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

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.

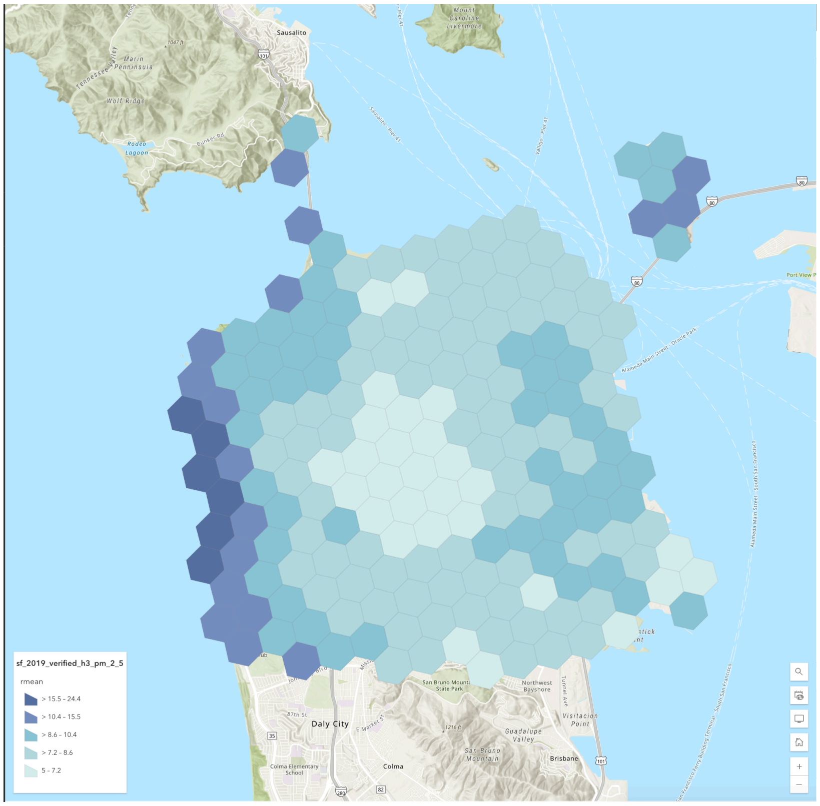

Figure 8: Example of a map of ambient concentration of $PM_{2.5}$ over a specific area plotted using hexbins. Map data © Mapbox, © OpenStreetMap.

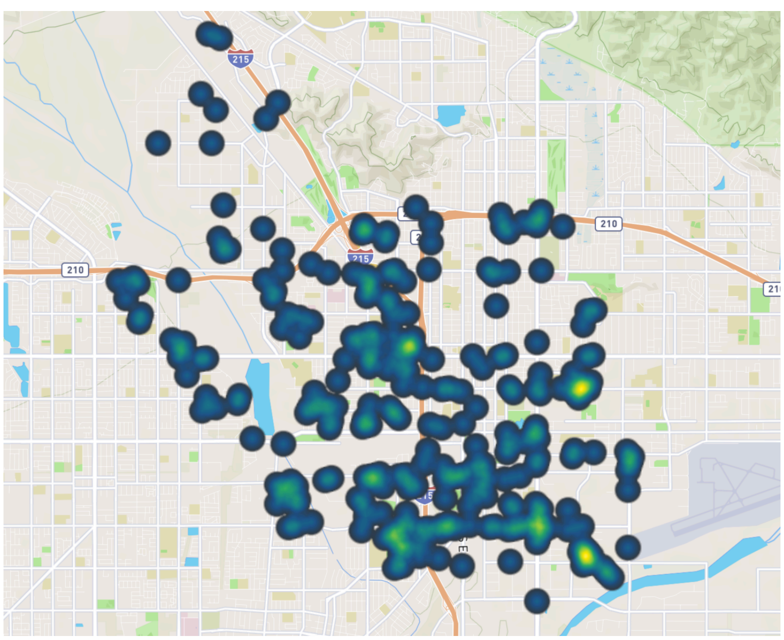

Figure 9: example of plotting an enhancement-based dataset (TVOCs) as a heatmap. Map data © Mapbox, © OpenStreetMap.

The individual PML labs will be responsible for analysis and interpretation of their own 1-s data, as well as the creation of visuals for the public. The implementation of the analysis might be slightly different from lab to lab.

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.

Pollutants that will be included and the assessment protocol and reporting structure are detailed in the table 9 below

Table 9: Pollutants that will be included and the assessment protocol and reporting structure

<table>
<tr><th>Pollutant</th><th>Initial Assessment Protocol</th><th>Data Reporting and Communication to CARB</th><th>Community Updates</th></tr>
<tr><td>Methane/Ethane</td><td>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</td><td>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</td><td>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:</td></tr>
</table>

		business days of verification	○ All events detected over the course of the campaign ○ Historical patterns and trends ○ Overall progress and response efforts
TVOCs (Total Volatile Organic Compounds)	Aclima: ● Alert Detection ○ Detection above threshold agreed on with CARB ● Data Analysis ○ Validation of Measurements ○ Trend and Historical Data Assessment ○ Environmental Context Evaluation ○ Repeated measurements	Aclima: ● If Alert is Deemed Viable – Prepare and Submit Report: ○ Location/Time of Event ○ VOC Classification (Combustion or Evaporative) ○ Historical detections in the area ○ 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 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
Toxic Air Contaminants	PMLs: Alert detection ● Detection above threshold (will refer to short term permissible exposure limit (PEL) or Recommended Exposure Limit	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	CARB: ● Monthly Summary Reports will be posted to the CARB website and will include: ○ A summary of reports generated

	(REL) as appropriate) Data Analysis ● Validation of Measurements ● Repeated measurements ● Environmental context evaluation	● 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.	○ 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

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 and broad area monitoring.

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.

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