



California Rural Legal Assistance, Inc.
Rural Roots, Justice for All

April 1, 2026

Community and Environmental Epidemiology Research Branch
Office of Environmental Health Hazard Assessment (OEHHA)
1001 I St., fl. 12
Sacramento, CA 95814

RE: Comment Letter on Draft CalEnviroScreen 5.0

California Rural Legal Assistance, Inc. (CRLA) appreciates this opportunity to submit written comments on the Draft CalEnviroScreen 5.0 (Draft CES 5.0). CRLA is a nonprofit law firm that provides free legal services to low-income residents of California's rural counties. Our work includes ensuring environmental justice and equitable infrastructure development in disadvantaged unincorporated communities throughout the Central Valley and Central Coast regions. CRLA applauds OEHHA for updating CalEnviroScreen as it is a critical tool that we as well as other organizations use to identify individual and cumulative environmental health impacts in the communities we serve. We provide the following recommendations to the Draft CES 5.0:

- I. We are pleased to see the Draft CES 5.0 include the Small Air Toxic Sites indicator. Similarly, **we recommend that OEHHA also include the locations of as well as air quality impacts from dairies and other confined animal feeding operations (CAFOs) as a standalone indicator.** This is important to ensure that CalEnviroScreen 5.0 adequately and equitably maps significant local air pollution sources and air quality impacts across both urban and rural areas of the state.
- II. **We recommend that OEHHA adopt an additional indicator regarding the affordability of drinking water,** an issue that disproportionately impacts communities in the Central Coast and Central Valley.
- III. **We recommend that OEHHA incorporate the most up-to-date available data on groundwater levels** into the Groundwater Threats indicator to ensure that CalEnviroScreen 5.0 captures the impact of drought and water use. Many Californians struggle with water availability issues due to drought and groundwater overdraft. Decreasing groundwater levels have disproportionately impacted rural Californians living

in the Central Valley and Central Coast, especially individuals and communities relying on groundwater wells.

IV. We recommend that OEHHA add a new indicator regarding access to green space.

The lack of access to green space is an environmental injustice that disproportionate impacts unincorporated communities in the Central Valley and other underserved communities and should be captured in CalEnviroScreen 5.0.

V. We request further clarifying information from OEHHA regarding significant regional ranking changes in the Draft CalEnviroScreen 5.0. Particularly, why some communities—especially in the Central Valley—may fall below the 75th percentile despite ongoing environmental and health burdens.

I. OEHHA Should Include the Locations of and Air Quality Impacts from Dairies and Other Confined Animal Feeding Operations (CAFOs) as a Standalone Indicator.

We recommend that OEHHA incorporate an additional indicator to capture the locations of as well as negative air quality impacts from dairies and other Concentrated Animal Feeding Operations (CAFOs). While CalEnviroScreen 4.0 incorporates data on CAFO discharges as part of its Groundwater Threats indicator, it does not directly address the threats CAFOs pose to air quality. Similar to Small Air Toxic Sites (SmATS), CAFOs are individual sites that produce a “complex mixture” of air contaminants that pose a unique cumulative threat that disproportionately impacts nearby communities. OEHHA should include in CalenviroScreen 5.0 a CAFO air quality impacts indicator modeled upon the Small Air Toxic Sites indicator.

a. CAFOs, Like Small Air Toxic Sites, Produce Complex and Significant Cumulative Impacts on Local Community Air Quality and Public Health That Are Inadequately Captured by Existing Indicators.

The purpose of CalEnviroScreen is to reflect cumulative impacts. The addition of the Small Air Toxic Sites indicator improves CalEnviroScreen’s ability to reflect cumulative impacts by filling a key gap in the existing framework. Rather than relying solely on the results of monitoring data to characterize the impacts of SmATS pollution, Draft 5.0’s SmATS indicator incorporates the specific location of each SmATS into CES 5.0 as a categorical signifier of the pollution burden experienced by communities in the same and/or adjacent census tracts. This is a strong step toward ensuring CalEnviroScreen reflects the specific pollution sources in/near and therefore burdens faced by disadvantaged communities around the State, including pollution sources that are not easily distinguishable in high level monitoring data.

Like SmATS, dairies and other concentrated animal feeding operations are discrete sites that produce complex and significant cumulative impacts on the local environment and public health. For instance, in a nationwide study mapping cattle operations, researchers found that PM_{2.5} concentrations were 28% higher in census tracts that had these operations.¹ In a study of dairy CAFOs in the Yakima Valley, Washington State measured elevated airborne particulate matter and ammonia up to 3 miles from dairy operations.² Please see Section I.a.i. below for a list of major air pollutants and related health impacts from dairies and other CAFOs.

Unfortunately, although the Groundwater Threats indicator includes dairy and feedlot data to ensure it reflects their impact on groundwater, the air quality impacts of CAFOs are not adequately captured by existing indicators. For all the same reasons the SmATS indicator is a critical addition to Draft 5.0, CAFOs should be given their own specific indicator based on the SmATS indicator methodology.

i. CAFOs produce a “complex mixture” of air pollutants with compounded health impacts borne disproportionately by “fence line” communities near the CAFO site.

As discussed earlier, like SmATS, CAFOs are individual sites that contribute to a “complex mixture” of diverse air pollutants that can result in cumulative environmental and health impacts. The worst impacts of these health impacts are felt by what Draft CES 5.0 terms “fence line” communities near SmATS and CAFO sites.

Draft CES 5.0 highlights how the health risks posed by SmATS such oil and natural gas wells derive from a complex mixture of toxic air contaminants, volatile organic compounds (VOCs), odorous compounds, and additional pollutants and environmental hazards. The pollutants produced by CAFOs are similarly diverse and interconnected and derive from multiple sources across each CAFO and its associated lands. Key air pollutants and related health impacts from dairies and other CAFOs include:

- **Methane and Ozone.** Dairy farms are the primary source of methane pollution, with methane coming from cow burping and belching and concentrated manure lagoons.³ In

¹ Sanaz Chamanara, Dimitrios Gounaridis, Benjamin Goldstein & Joshua P. Newell, *Geography of animal feeding operations and their contribution to fine particulate matter pollution in vulnerable communities in the United States*, 6 *Commun Earth Environ* (620) (Aug. 2025), <https://doi.org/10.1038/s43247-025-02520-w>.

² Arbor J.L. Quist, Jill E. Johnston, & Mike Dolan Fliss, *Disparities of industrial animal operations in California, Iowa, and North Carolina*, Earthjustice (Oct. 2022), https://earthjustice.org/wp-content/uploads/quistreport_cafopetition_oct2022.pdf.

³ S. E. Place & F.M. Mitloehner, *Invited review: Contemporary environmental issues: A review of the dairy industry's role in climate change and air quality and the potential of mitigation through improved production efficiency*, 93 *Journal of Dairy Science* at 3407–3416 (April 2010). <https://doi.org/10.3168/jds.2009-2719>.

California, an estimated half of methane emissions come from dairy farms.⁴ While a major concern for methane surrounds its impact on global warming, methane can contribute to the formation of ground-level ozone (when methane reacts with nitrogen oxide and sunlight in the atmosphere), and exposure to elevated ozone levels can lead to respiratory issues.⁵

- **Ammonia.** According to the US EPA, livestock operations contribute to 56% of ammonia emissions in California.⁶ Ammonia from dairy farms is formed when the urea found in cow urine combines with compounds found in feces, where some of the ammonia becomes airborne.⁷ The main sources of ammonia on dairy farms are manure storage lagoons, fresh manure, and manure application to agriculture.⁸ Exposure to ammonia can cause health impacts. Exposure to ammonia can cause eye nose and skin irritation, reduced lung function, and chronic respiratory disease.⁹ Additionally, ammonia is a precursor for PM2.5, which can result in significant health impacts as discussed below.
- **PM 2.5.** Agricultural PM2.5 emissions contribute up to 30% of PM2.5 emissions in the US.¹⁰ At dairy farms, PM2.5 is produced from dairy cow movement and from ammonia aerosols reacting with other pollutants in the atmosphere.¹¹ Exposure to particulate matter

⁴ Alison R. Marklein, Deanne Meyer, Marc L. Fischer, Seongeun Jeong, Talha Rafiq, Michelle Carr, & Francesca M. Hopkins, *Facility-scale inventory of dairy methane emissions in California: Implications for mitigation*. Earth 13 System Science Data 1151 (Mar. 2021), <https://doi.org/10.5194/essd-13-1151-2021>.

⁵ Susan C Anenberg, Joel Schwartz, Drew Shindell, Markus Amann, Greg Faluvegi, *et al.*, *Global air quality and health co-benefits of mitigating near-term climate change through methane and black carbon emission controls*. 120 Environmental health perspectives 831, 831-839 (Mar. 2012), <https://pubmed.ncbi.nlm.nih.gov/22418651/>

⁶ U.S. EPA, 2018, as cited in N. T. Vecchi, J. Mellqvist, J. Samuelsson, B. Offerle, & C. Scheutz, *Ammonia and methane emissions from dairy concentrated animal feeding operations in California, using Mobile Optical Remote Sensing*. 293 Atmospheric Environment (Jan. 15, 2023), <https://doi.org/10.1016/j.atmosenv.2022.119448>.

⁷ Place (2010); Bill Weiss *Ammonia emissions from dairy farms - the basics*, Ohio Dairy Industry Resources Center, 7 Buckeye Dairy News (2) (2005), <https://dairy.osu.edu/newsletter/buckeye-dairy-news/volume-7-issue-2/ammonia-emissions-dairy-farms-basics#:~:text=Under%20laboratory%20conditions%20where%20urine.increases%20and%20ammonia%20volatilization%20increases>.

⁸ Leah Grout, Michael G. Baker, Nigel French, & Simon Hales, *A Review of Potential Public Health Impacts Associated With the Global Dairy Sector*. 4 GeoHealth (2) (Jan. 3, 2020), <https://doi.org/10.1029/2019GH000213>.

⁹ Grout (2020); Place (2010).

¹⁰ Horacio A. Aguirre-Villegas¹, Caleb Besson, & Rebecca A. Larson, *Modeling ammonia emissions from manure in conventional, organic, and grazing dairy systems and practices to mitigate emissions*, 107 Journal of Dairy Science 359, 359–382 (Jan. 2024), <https://doi.org/10.3168/jds.2023-23782>. Katie E. Wyer, David B. Kelleghan, Victoria Blanes-Vidal, Günther Schauburger, & Thomas P. Curran, *Ammonia emissions from agriculture and their contribution to fine particulate matter: A review of implications for human health*. 323 Journal of Environmental Management (Dec. 2022), <https://www.sciencedirect.com/science/article/pii/S0301479722018588#bib12>.

¹¹ Place (2010), Grout (2020).

and ammonia has been associated with respiratory illnesses such as asthma and chronic obstructive pulmonary disease, irritation of the eyes and airways, neurological and gastrointestinal symptoms, and higher rates of acute gastrointestinal illness hospitalizations, particularly among children and residents living near cattle, poultry, and swine CAFOs.¹²

- **VOCs.** Volatile organic compounds (VOCs) are carbon-based gases that contribute to ground level ozone when combined with nitrogen oxides in sunlight. At dairy farms, VOCs are produced primarily from silage, a type of fermented livestock feed, but can also be produced from cow waste.¹³ A study examining volatile organic compounds in the San Joaquin Valley attributed the majority of VOC emissions to the surrounding dairy farms.¹⁴ Exposure to elevated levels of VOCs can result in respiratory irritation, cardiovascular dysfunction, metabolic disorders such as obesity and diabetes, reproductive harms, and increased risk of cancers affecting organs such as the bladder, colon, cervix, and esophagus.¹⁵
- **Bioaerosols.** Bioaerosols are particulates suspended in the air that come from plants, animals and microbes. These can include bacteria like *E. coli* and staphylococcus, fungus spores, pollen, and viruses. Dairy farms produce bioaerosols from the animal movement, manure management, feeding areas, and bedding.¹⁶ In California, a study looking at bioaerosol emissions from two dairies in Central and Sonoma Valleys found several types of bacteria that impact human health.¹⁷ Endotoxins from bacteria aerosols are a primary health concern because they can reach deep into the lungs and trigger an immune response. Exposure to bioaerosols leads to asthma and allergen-like symptoms and decreases lung function over time. Surrounding communities can be continuously impacted because bioaerosols stay in the air for a long time and can travel far away from

¹² Arbor J.L. Quist, Jill E. Johnston, and Mike Dolan Fliss, *Disparities of industrial animal operations in California, Iowa, and North Carolina*, Earthjustice (Oct. 2022), https://earthjustice.org/wp-content/uploads/quistreport_cafopetition_oct2022.pdf.

¹³ Grout (2020); Place (2010).

¹⁴ P Eva Y. Pfannerstill, Caleb Arata, Qindan Zhu, Benjamin C. Schulze, Roy Woods, John H. Seinfeld, Anthony Bucholtz, Ronald C. Cohen, & Allen H. Goldstei, *Volatile organic compound fluxes in the agricultural San Joaquin Valley – spatial distribution, source attribution, and inventory comparison*, 23 *Atmospheric Chemistry and Physics* 12753, 12753–12780. <https://doi.org/10.5194/acp-23-12753-2023>.

¹⁵ Xihe Zhou, Xiang Zhou, Chengming Wang, & Handong Zhou, *Environmental and Human Health Impacts of Volatile Organic Compounds: A Perspective Review*, 313 *Chemosphere* (Feb. 2023), <https://doi.org/10.1016/j.chemosphere.2022.137489>.

¹⁶ Grout (2020); Pradeep Kumar, Shalini Tiwari, Seyit Uguz, Zonggang Li, Jose Gonzalez, Lin Wei, Ryan S. Samuel, Yuanhui Zhang, & Xufei Yang, *Bioaerosols downwind from animal feeding operations: A comprehensive review*, 480 *Journal of Hazardous Materials* (Dec. 5, 2024). <https://doi.org/10.1016/j.jhazmat.2024.135825>.

¹⁷ Subbarao V. Ravva, Chester Z. Sarreal, & Robert E. Mandrell, *Bacterial communities in aerosols and manure samples from two different dairies in central and Sonoma valleys of California*. 6 *PloS one* (2) (Feb. 18, 2011), <https://doi.org/10.1371/journal.pone.0017281>.

the source.¹⁸ Bioaerosols can also be zoonotic, with pathogens spreading to communities living near dairy farms through contaminated dust.¹⁹

- **Hydrogen Sulfide.** Hydrogen sulfide (H₂S) is formed when sulfur-containing compounds in manure are degraded.²⁰ Hydrogen sulfide (H₂S) is a heavy gas that can be fatal in confined spaces at high concentrations, and potentially harmful at lower concentrations over longer periods of time. Direct exposure to hydrogen sulfide in enclosed spaces like animal facilities can lead to brain injuries, abnormal heartbeats, respiratory arrest, and death in severe cases, and long term exposure in communities surrounding pollutant sources may also lead to health impacts.²¹ A review of studies on community exposure found that long term exposure to hydrogen sulfide can lead to impaired lung function, nasal irritation, and reported neurological effects such as hallucination, headaches, and memory loss.²²

In summary, CAFOs produce a diverse range of air pollutants that interact to produce complex cumulative impacts that most heavily impact nearby communities. In California, the vast majority of CAFOs, including dairies, are located in the San Joaquin Valley. Therefore, communities in the San Joaquin Valley, in particular low-income communities of color, are “fence line” communities that are disproportionately face air and water quality and related health impacts from CAFOs.²³ In order for CES Draft 5.0 to effectively address the health hazards faced by these fence line communities, CAFO locations are as critical to include in the air quality indicators as SmATS.

¹⁸ Grout (2020); Kumar (2024); Sheena E. Martenies, Joshua W. Schaeffer, Grant Erlandson, Mary Bradford, Jill A. Poole, Ander Wilson, Zachary Weller, Stephen J. Reynolds, & Sheryl Magzamen, *Associations Between Bioaerosol Exposures and Lung Function Changes Among Dairy Workers in Colorado*, 62 *Journal of occupational and environmental medicine* 424 (June 2020), <https://doi.org/10.1097/JOM.0000000000001856>.

¹⁹ Grout (2020).

²⁰ Zhifang Shi, Xiaoqin Sun, Yao Lu, Lei Xi & Xin Zhao, *Emissions of ammonia and hydrogen sulfide from typical dairy barns in central China and major factors influencing the emissions*, 9 *Scientific Reports* (1) (Sept. 25, 2019), <https://doi.org/10.1038/s41598-019-50269-y>.

²¹ Grout (2020); Shi (2019); *Toxicological Profile for Hydrogen Sulfide and Carbonyl Sulfide*, Agency for Toxic Substances and Diseases Registry (ASTDR) (Nov. 2016), US. Department of Health and Human Services, <https://www.atsdr.cdc.gov/toxprofiles/tp114.pdf>; Jesse D Berman, Neal Fann, John W Hollingsworth, Kent E Pinkerton, William N Rom, Anthony M Szema, Patrick N Breyse, Ronald H. White & Frank C. Curriero, *Health benefits from large-scale ozone reduction in the United States*, 120 *Environmental health perspectives* 1404 (201), <https://doi.org/10.1289/ehp.1104851>.

²² ATSDR (2016).

²³ Zoe Robertson, Evan Lehmann, Amanda Zerbe, Avery Bick & Deborah A. Siva, *Confined Animal Facility Permitting and Reporting Under the Porter-Cologne Water Quality Control Act: An Analysis of Regional Board Activities*, Stanford Law School Environmental & Natural Resources Law and Policy Program, Feb. 2016 at 12-13, https://law.stanford.edu/wp-content/uploads/2026/02/Robertson-et-al_CAF-Permitting-and-Reporting-Under-the-PCA_ENRLP_compressed-11AM.pdf.

ii. Like SmATS, the air pollution impacts from CAFOs are not adequately captured by the other existing indicators in draft 5.0.

Of the air pollutants produced by CAFOs, Ozone and PM 2.5 already have their own indicators in Draft 5.0. However, CalEnviroScreen’s indicators for Ozone and PM 2.5 rely exclusively on monitoring data from the California Air Resources Board’s network of air monitoring stations. This data provides a coarse level of detail that would be improved significantly by the inclusion of the pinpointed air quality data that CAFO locations would provide. Furthermore, including an indicator reflecting CAFO locations would be a way to track the other CAFO-produced air contaminants not already tracked by other indicators.

The SmATS indicator was added specifically because existing monitoring data alone is inadequate to characterize the localized impacts of individual air polluting sites. Adding a CAFO indicator would fill a similar gap in the data available from Ozone and PM 2.5 air monitoring station readings. For the same reason this air quality monitoring system is inadequate to characterize the air quality threat posed by SmATS, it is inadequate to characterize the cumulative air quality threats posed by CAFOs.

b. CES 5.0 Should Be Updated to Include an Indicator for CAFOs. This New Indicator Can Be Modeled After the Small Air Toxic Sites Indicator.

The Small Air Toxic Sites indicator methodology involves assigning a value of “1” to each small air toxic site and then adding weight adjustments for relevant factors such as the size of the site and the proximity to nearby communities. The specific locations of these SmATS are then included as a viewable layer on the CES 5.0 map. The CAFO indicator methodology should proceed from the same basic methodology approach and produce a similarly viewable layer with specific CAFO locations. [This map](#), released by Stanford’s Woods Institute for the Environment, contains every CAFO across the state and can be used as a basis for CES 5.0’s CAFO indicator.²⁴ Following the SmATS indicator method, each CAFO on this map should be assigned a score of 1 as a baseline. Then, adjustments can be added for factors relevant to the amount of air pollution produced by each CAFO. These factors should include, but are not necessarily limited to, the following:

- Herd size
- Lagoon acreage
- Feedlot acreage
- Land application acreage
- Relevant satellite monitoring data (as discussed in more detail below)

²⁴ Industrial Animal Agriculture Dashboard,
<https://experience.arcgis.com/experience/a9f2e9be4fcf4b12bfbbac209ce04ea4>

c. OEHHA Should Also Incorporate Satellite Monitoring Data into a New CAFO Air Quality Impacts Indicator and Other Appropriate Indicators.

Between 2019 and 2022, researchers covered 14 dairies located near Bakersfield and Tulare, California and reviewed the quantification and monitoring of ammonia and methane emission sources, finding such efforts crucial to effectively planning and implementing air quality and climate change policies.²⁵ Their research also demonstrated new air measurement methods, which may be used to quantify emissions over large areas with high spatial resolution and in a relatively short period—bridging the gap between satellites and individual CAFOs measurements. **To accurately capture cumulative impacts, we recommend that OEHHA incorporate satellite-based observations into existing data collection frameworks in regards to air quality impacts from dairies and other CAFOs.**

In particular, data from Sentinel-5P and its TROPOMI instrument provide an important opportunity to enhance regional air quality assessment. TROPOMI offers near-daily global coverage and has been widely used to detect atmospheric concentrations of methane (CH₄) and other trace gases at spatial scales relevant to regional analysis.²⁶ While satellite data alone may not resolve emissions at the scale of individual CAFO facilities, studies have demonstrated its effectiveness in identifying emission hotspots and tracking temporal trends across agricultural regions, including California’s San Joaquin Valley.²⁷ Incorporating satellite data can help communities and agencies understand cumulative air quality impacts, thereby informing more effective regulatory strategies and advancing public health protections in fence line communities.

²⁵ N.T. Vecchi, J. Mellqvist, J. Samuelsson, B. Offerle & C. Scheutz, *Ammonia and methane emissions from dairy concentrated animal feeding operations in California, using mobile optical remote sensing*, 293 *Atmospheric Environment* (Jan. 15, 2023), <https://doi.org/10.1016/j.atmosenv.2022.119448>.

²⁶ J. Pepijn Veeffkind, I. Aben, K. McMullan, H. Förster, J. De Vries, G. Otter, Jacques Claas *et al.*, *TROPOMI on the ESA Sentinel-5 Precursor: A GMES mission for global observations of the atmospheric composition for climate, air quality and ozone layer applications*, 120 *Remote sensing of environment* 70 (2012), <https://doi.org/10.1016/j.rse.2011.09.027>.

Wei Hu, Qin Kai, Fan Lu, Li Ding & Jason B. Cohen, *Merging TROPOMI and eddy covariance observations to quantify 5-years of daily CH₄ emissions over coal-mine dominated region*, 11 *International Journal of Coal Science & Technology* 55, 56 (July 2024), <https://doi.org/10.1007/s40789-024-00700-1>.

²⁷ Daniel H. Cusworth, Riley M. Duren, Andrew K. Thorpe, Winston Olson-Duvall, Joseph Heckler, John W. Chapman, Michael L. Eastwood *et al.*, *Intermittency of large methane emitters in the Permian Basin*, 8 *Environmental Science & Technology Letters* 567 (2021), <https://doi.org/10.1021/acs.estlett.1c00173>.
Riley M. Duren, Andrew K. Thorpe, Kelsey T. Foster, Talha Rafiq, Francesca M. Hopkins, Vineet Yadav, Brian D. Bue *et al.*, *California’s methane super-emitters*, 575 *Nature* 180 (2019), <https://doi.org/10.1038/s41586-019-1720-3>.

II. OEHHA Should Adopt an Additional Indicator Regarding the Affordability of Drinking Water, an Issue That Disproportionately Impacts Communities in the Central Coast and Central Valley.

a. We are Pleased to see OEHHA’s Proposal to Include Per- and Polyfluoroalkyl Substances (PFAS) into the Drinking Water Contaminants Indicator.

We appreciate that the Draft CalEnviroScreen 5.0 includes a refinement of its methodology for calculating the Drinking Water Contaminants indicator, and the addition of per- and polyfluoroalkyl substances (PFAS) chemical monitoring data into its indicator.

First, OEHHA states that the proposed cumulative water contaminant hazard index and violation component value in Draft CES 5.0 is both more health protective and measurable for each contaminant because it is closer to the Public Health Goal (PGH) which often sets health-based levels of contaminants at zero for carcinogens and is designed to eliminate significant health risks over a lifetime of consumption. We agree that this update improves the drinking water contaminants index.

Second, in addition to the 14 contaminants currently tested in drinking water, OEHHA proposes to include data from six federally regulated per- and polyfluoroalkyl substances (PFAS) as part of the Drinking Water Contaminants indicator. This update responds to concerns raised by communities in the Greater Los Angeles Area regarding PFAs in drinking water and would likely help address similar concerns about the scope of PFAs testing in the Central Valley. However, significant concerns remain regarding whether current data collection methods adequately capture conditions in rural and unincorporated communities. These areas often have fewer regulated public water systems, rely more heavily on small systems or private wells, and experience less frequent or less comprehensive PFAS monitoring.²⁸ As a result, available datasets may underrepresent PFAS exposure risks in rural populations compared with urban areas, where larger public water systems typically conduct more consistent testing and reporting.

b. The Drinking Water Contaminants Indicator Does Not Address Drinking Water Affordability.

At OEHHA’s April 7, 2021, workshop on the Draft CalEnviroScreen 5.0, community members expressed concern regarding CalEnviroScreen’s lack of consideration for the

²⁸ Kelly L. Smalling, Paul M. Bradley, *Invited Perspective: Per- and Polyfluoroalkyl Substances in Drinking Water—Disparities in Community Exposures Based on Race and Socioeconomic Status*, 132 *Environmental Health Perspectives* 041302-1 (April 2024), <https://doi.org/10.1289/EHP13899>. See also: Sarah Trent, *A quarter of rural water systems likely contain ‘forever chemicals’*, High Country News (July 2023), <https://www.hcn.org/articles/pollution-a-quarter-of-rural-and-private-water-systems-likely-contain-forever-chemicals/>.

affordability of drinking water.²⁹ CRLA recommends that OEHHA acknowledge this socioeconomic burden by adding a drinking water affordability indicator in CalEnviroScreen 5.0.

c. Water Remains Unaffordable in Many California Communities and CalEnviroScreen 5.0 Should Reflect This Socioeconomic Burden.

According to the SWRCB’s 2025 Drinking Water Needs Assessment, more than 735,000 California residents are still served by the nearly 400 water systems that fail to meet state requirements for safe and reliable drinking water.³⁰ In California, one contaminant—1,2,3-TCP—was detected more frequently in domestic wells (8%) than in public-supply wells (5%), indicating potentially greater exposure risk for households relying on private groundwater sources. Most detections occurred in the San Joaquin Valley, where 16–18% of wells exceeded the Maximum Contaminant Level, highlighting significant regional contamination concerns.³¹

OEHHA accurately recognizes in the Draft CalEnviroScreen 5.0 that low income and rural communities—particularly those served by small community water systems and often found in rural agricultural areas—are often disproportionately exposed to contaminants in their drinking water from nearby agricultural activities.³² These include rural residents of the San Joaquin Valley receive water primarily from shallow domestic wells, where elevated levels of nitrates continue to contaminate drinking water and cause various adverse health impacts.³³

Rural communities relying on decentralized water sources such as small water systems and individual wells are also frequently forced to navigate significant financial challenges in part due to the fact that their groundwater sources are highly contaminated, where the advanced water

²⁹ See: *Workshop Comments on Draft CalEnviroScreen 4.0*, Office of Environmental Health Hazard Assessment (June 2021), <https://oehha.ca.gov/sites/default/files/media/downloads/cnr/calenviroscreen40workshopcommentssummaryd12021.pdf>.

³⁰ *2025 Drinking Water Needs Assessment*, California State Water Resources Control Board (June 2025), https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/needs/2025needsassessment.pdf.

³¹ Karen R. Burow, Walter D. Floyd, and Matthew K. Landon, *Factors Affecting 1,2,3-trichloropropane Contamination in Groundwater in California*, 672 *Science of The Total Environment* 324 (July 2019), https://www.sciencedirect.com/science/article/abs/pii/S0048969719314317?fr=RR-2&ref=pdf_download&rr=9e5324032be39ddb.

³² Pace C, Balazs C, Bangia K, Depsky N, Renteria A, Morello-Frosch R, et al., *Inequities in Drinking Water Quality Among Domestic Well Communities and Community Water Systems, California*, 112 *American Journal of Public Health* 88 (Jan. 2022) <https://doi.org/10.2105/AJPH.2021.306561>.

Carolina Balazs, Rachel Morello-Frosch, Alan Hubbard & Isha Ray, *Social Disparities in Nitrate Contaminated Drinking Water in California’s San Joaquin Valley*, 119 *Environmental health perspectives* 1272, <https://doi.org/10.1289/ehp.1002878>. See also: James VanDerslice, *Drinking water infrastructure and environmental disparities: evidence and methodological considerations*, 101 *American Journal of public health* S109 (2011), <https://doi.org/10.2105/AJPH.2011.300189>.

³³ K.M. Lockhart, A.M. King, and T. Harter, *Identifying sources of Groundwater Nitrate Contamination in a Large Alluvial Groundwater Basin with Highly Diversified Intensive Agricultural Production*, 151 *Journal of Contaminant Hydrology* 140 (Aug. 2013), <https://www.sciencedirect.com/science/article/abs/pii/S0169772213000855?via%3Dihub>.

treatment needed to ensure that the systems meet safe drinking water standards is often cost prohibitive.³⁴ The US EPA similarly notes that utilities must raise revenue to cover increased costs associated with treatment, infrastructure upgrades, and compliance with health standards, which can contribute to higher water rates for customers in similarly impacted areas.³⁵ In 2021, the State Water Board estimated that 21% of the state’s water systems, serving 18% of all residents, had water rates that were unaffordable for basic needs like cooking, washing, and drinking.³⁶

Similar to the Children’s Lead Risk from Housing indicator—which considers the percentage of the total households in each census tract that are both low-income, or household incomes less than 80% of the county—an indicator for drinking water affordability should consider either low-income household or poverty in relation to the cost of drinking water by region. Communities already disproportionately exposed to drinking water contaminants—particularly low-income, rural, and agricultural regions—often face the additional hardship of paying higher rates to fund treatment, infrastructure upgrades, or alternative water supplies necessary to meet public health standards. When households must devote a greater share of limited income to obtain safe drinking water, the resulting financial strain can exacerbate existing socioeconomic vulnerabilities that CalEnviroScreen is designed to capture.

Water affordability tracking exists and is captured by the State Water Resources Control Board (State Water Board) through its Water System Financial Capacity and Community Affordability Dashboard as well as its Drinking Water Needs Assessment. The dashboard compiles financial and socioeconomic indicators using data reported by water systems through Electronic Annual Reports and publicly available demographic data (e.g., U.S. Census), allowing the State to evaluate the relationship between system costs, rates, and community economic conditions.

Within the Drinking Water Needs Assessment, the State Water Board evaluates affordability using standardized indicators such as percent median household income (%MHI) spent on water bills, “extreme water bill” metrics, and broader socioeconomic burden measures that account for poverty and housing cost pressures. These indicators estimate the cost of basic household water use relative to local income levels and are used to identify disadvantaged communities and prioritize funding.

³⁴ Rebecca G. Etter, Jillian Maxcy-Brown, and Mark O. Barnett, *Affordability of community water systems and private, self-supply drinking water wells*, PLOS Water 4, No. 9 (Sept. 2025): 3-4, <https://journals.plos.org/water/article?id=10.1371/journal.pwat.0000423#:~:text=Of%20the%20total%20U.S.%20land,25%2C26%2C41%5D>.

³⁵ Water Affordability Resources for Utilities, United States Environmental Protection Agency (June 2025), <https://www.epa.gov/waterfinancecenter/water-affordability-resources-utilities>.

³⁶ Caitrin Chappelle & Ellen Hanak, *Water Affordability in California*, Public Policy Institute of California: Water Policy Center (May 2021), <https://www.ppic.org/wp-content/uploads/water-affordability.pdf>.

In conclusion, **OEHHA should integrate a drinking water affordability indicator into CalEnviroScreen 5.0 to more accurately reflect the socioeconomic burdens resulting from water vulnerability in many regions.** Low-income and rural communities already disproportionately exposed to contaminants often face higher water costs compounding existing socioeconomic vulnerability. Since the State Water Resources Control Board already tracks standardized affordability metrics, reliable data exists to support a Drinking Water Affordability indicator.

III. OEHHA Should Incorporate Groundwater Level Monitoring into Its Groundwater Threats Indicator.

California communities in rural or agricultural regions suffer significant impacts from both groundwater contamination and groundwater depletion. CalEnviroScreen 5.0's Groundwater Threats indicator effectively captures groundwater contamination by utilizing updated data on groundwater cleanup sites and data for dairies and feedlots. However, the Groundwater Threats indicator fails to include data on groundwater levels. Groundwater depletion is a threat that disproportionately impacts vulnerable communities and low-income residents in rural areas like California's Central Valley.

Groundwater level data should be included as an additional component of the Groundwater Threats indicator. Several regions in California rank among the world's most rapidly declining aquifers.³⁷ In California's Cuyama Valley, its groundwater basin has been dropping almost 5 feet a year while residents, farmers and even the school district are locked in a court battle over groundwater rights.³⁸ Four other basins in the San Joaquin Valley and one in northeastern San Diego join the Cuyama Valley in the top 100, with water levels falling up to almost four feet a year.³⁹

Overdraft and declining groundwater levels disproportionately burden disadvantaged communities in the Central Valley, many of which rely on shallow domestic wells that are more vulnerable to going dry as water tables fall.⁴⁰ Research shows that groundwater-dependent low-income communities and communities of color are particularly exposed to water insecurity

³⁷ Scott Jasechko, Hansjorg Seybold, Debra Perrone, *et al.*, *Rapid Groundwater Decline and Some Cases of Recovery in Aquifers Globally*, **625** *Nature* 715 (2024), <https://doi.org/10.1038/s41586-023-06879-8>.

³⁸ Jasechko (2024). *See also:* Rachel Becker, *California ranks high worldwide for rapidly depleted groundwater*, *Cal Matters Environment* (2024), <https://calmatters.org/environment/2024/01/california-rapidly-depleted-groundwater/>.

³⁹ Jasechko (2024).

⁴⁰ Darcy Bostic, Linda Mendez-Barrientos, Rich Pauloo, Kristin Dobbin, and Victoria MacClements, *Thousands of domestic and public supply wells face failure despite groundwater sustainability reform in California's Central Valley*, 13 *Scientific reports* (1) (Sept. 8, 2023), <https://doi.org/10.1038/s41598-023-41379-9>.

because they often lack the financial and political resources needed to adapt to declining groundwater availability or participate effectively in groundwater governance processes.⁴¹

The California Department of Water Resources (DWR) is the primary agency tracking groundwater levels through the California Statewide Groundwater Elevation Monitoring (CASGEM) Program following the SGMA's implementation. Since 2009, CASGEM has provided a permanent and locally managed program of regular and systematic monitoring to track seasonal and long-term groundwater elevation trends in groundwater basins and non-basin areas statewide. We will note, however, that CASGEM does not account for broader regional changes in total groundwater storage, particularly in areas with sparse well coverage or limited reporting, as well as the cumulative impacts of sustained overdraft across interconnected basins.

To address these gaps, **we recommend that OEHHA consider supplementing CASGEM data with satellite-based observations from GRACE and GRACE-FO, which provide independent, large-scale estimates of changes in groundwater storage over time.** While CASGEM offers critical localized measurements, GRACE-derived data can capture regional trends and cumulative losses that may not be visible through well-based monitoring alone. Integrating these datasets would provide a more comprehensive understanding of groundwater depletion across California, particularly in underserved rural areas where monitoring infrastructure is limited. Such an approach would strengthen OEHHA's ability to assess groundwater-related risks and threats, improve identification of vulnerable communities, and support more informed and equitable water management decisions under the Sustainable Groundwater Management Act.

IV. OEHHA Should Add a New Indicator Regarding Access to Green Space.

Access to green spaces is a critical factor in community health. The presence of green spaces in communities has benefits for residents' mental and physical health and insulates communities from air pollution and climate related risk factors. Conversely, the absence of green spaces leaves communities more vulnerable to these risks and reduces the health of communities as a whole. The lack of access to green spaces disproportionately impacts disadvantaged communities statewide. OEHHA should create an additional population characteristic indicator in CES 5.0 to capture the extent of communities' access to green spaces.

Green spaces have a positive impact on climate change, mitigating its harmful effects. One benefit of green spaces is their general cooling effect. When designed properly, they can

⁴¹ Clara M. Acleo & Linda E. Mendez-Barrientos, *Groundwater Management in California's Central Valley: A Focus on Disadvantaged Communities*, 3 Case Studies in the Environment 1, 1-4 (2019) <https://doi.org/10.1525/cse.2018.001883>.

reduce local temperatures by up to 7°C.⁴² Green spaces with ample amounts of trees have a pollution reduction effect by reducing particulate matter (Environmental Protection Agency). In addition to their climate and air pollution risk mitigating properties, green spaces are linked with overall good public health. Increased use and exposure to green spaces are also associated with a lower risk of Type 2 diabetes (T2D), preterm birth, and an increase in good self-reported health.⁴³ Incidences of certain indicators that are incorporated in CalEnviroScreen such as asthma and coronary heart disease were also found to be reduced when green space usage increases.⁴⁴ Thus, there is a strong link between the exposure of green spaces and the incidences of the indicators that CalEnviroScreen incorporates into its model (asthma, and coronary heart disease). Conversely, the literature shows that less exposure to green spaces means an increased risk of health issues and greater exposure to pollutants.

Lack of access to green spaces is a significant resource deficiency that negatively impacts community health for many disadvantaged communities across the state. The Park Access Tool from the California Department of Parks and Recreation points out that 8.4 million residents in California live farther than 0.5 miles from a park, significantly limiting local access to parks for children, seniors, and residents with mobility challenges. The lack of access to park spaces is especially significant for many rural communities in the Central Valley. For instance, while 21% of Californians statewide live farther than half a mile from a park and 61% of Californians live in areas with less than 3 acres of parks per thousand residents, Merced County's percentages on the same metrics are 44% and 46% respectively. Furthermore, these numbers are also concentrated in other counties in the Central Valley: Tulare (45%, 55%), Fresno (40%, 78%), and Kern (43%, 64%). These numbers show that these communities have a lack of access to green spaces which have the potential to reduce climate vulnerability and improve overall health.

To develop a green space access indicator that effectively captures all the relevant components of meaningful public access to green spaces, we recommend that OEHHA consider utilizing the following factors and incorporating data from sources including but not limited to the following mapping tools:

- Park acreage per local population size is a metric reflecting the overall amount of green space available to for communities to use. The California Department of Parks and Recreation's [Community Fact Finder](#) tool includes data of this type that

⁴² Hadi Soltanifard & Majid Amani-Beni, *The cooling effect of urban green spaces as nature-based solutions for mitigating urban heat: insights from a decade-long systematic review*, 49 *Climate Risk Management* (2025), <https://doi.org/10.1016/j.crm.2025.100731>.

⁴³ Caoimhe Twohig-Bennett & Andy Jones, *The Health Benefits of the Great Outdoors: A Systematic Review and Meta-Analysis of Greenspace Exposure and Health Outcomes*, 166 *Environmental Research* 628 (2018), <https://doi.org/10.1016/j.envres.2018.06.030>.

⁴⁴ Twohig-Bennett & Jones (2018).

can be applied on a scale appropriate to the needs of CES 5.0 (e.g. census tract level).⁴⁵

- Tree cover is another important metric to include in a green space indicator. While some disadvantaged communities may have access to open spaces that are labeled as parks, the extent to which these parks can foster community health, reduce heat impacts, and absorb air pollution burdens is directly related to the amount of tree cover available in the area. The United States Department of Agriculture’s [California Urban Tree Canopy mapping tool](#) has data to reflect the amount of tree cover that can also be applied at the census tract level.⁴⁶
- Walkability to available park space is an important metric to capture in order to reflect the extent to which communities are able to utilize and benefit from park space within their local areas. The Trust for Public Land’s [Parkserve](#) tool incorporates data that reflects how well communities can access parks via pedestrian methods.⁴⁷

V. CRLA Requests That OEHHA Provide an Explanation Regarding Significant Ranking Changes Between CalEnviroScreen 4.0 and 5.0 Prior to Adopting the final CalEnviroScreen 5.0.

Following our review of the CalEnviroScreen 5.0 Draft, CRLA notes that the proposed updates have resulted in a slight decrease to the Bay Area and Central Valley’s share of 75th percentile tracts. Conversely, the Central Coast and other areas saw an increase in these tracts. However, the Central Valley remains the most burdened region by a percentage of 75th percentile tracts. Despite improvements from the 52nd percentile in CalEnviroScreen 4.0 to the 58th percentile in 5.0, primarily in Kern (-29), Tulare (-13), and Madera (-11) Counties—possibly due to lower diesel emissions—these counties also exhibited the highest average for Diabetes and Small Air Toxins levels. These changes in scores require further clarification regarding the consequences of these updates on Central Valley communities’ overall score, and how such changes reflect actual improvements in overburdened communities.

We request that OEHHA provide a summary of overall ranking changes in various regions in response to comments or additional addendum to the Draft CES 5.0 Report. In particular, OEHHA should provide an explanation of the reasons why communities that currently rank 75th percentile in CalEnviroScreen 4.0 may be ranked lower in the Draft CES 5.0. Under SB 535,

⁴⁵ *Statewide Parks Program Community FactFinder*, Parks for All Californians, <https://www.parksforcalifornia.org/communities/>

⁴⁶ California Urban Tree Canopy Viewer, <https://experience.arcgis.com/experience/eed846642273467ab698ab5435b493d6/page/Page>

⁴⁷ *ParkServe tool*, Trust for Public Land, <https://www.tpl.org/parkserve>.

disadvantaged communities as those that rank in the 75th percentile or higher under CalEnviroScreen, among other definitions. As such, census tracts that rank in the 75th percentile or higher are more likely to receive funding, including state funding that often provides much higher points to or requires communities to be disadvantaged communities. Therefore, it is important that OEHHA publish this explanation and do so *prior to* finalizing CES 5.0 in order to allow communities, especially those who may rank lower than 75th percentile in the Draft CES 5.0, to understand the decrease in their ranking, as well as be able to provide additional data or any data corrections to OEHHA, to ensure that the final CES 5.0 is accurate.

VI. Conclusion

CRLA appreciates OEHHA's incorporation of two new indicators—Small Air Toxic Sites and Diabetes Prevalence—which advance the mapping tool's ability to identify cumulative environmental and socioeconomic impacts in communities throughout California. Similarly, we appreciate OEHHA's refinement of the Drinking Water Contaminants indicator. However, several improvements may still be made regarding the Draft CES 5.0 to ensure that it truly captures environmental, health, and socioeconomic risks and threats to our most vulnerable communities. CRLA requests that the OEHHA add a dairy and CAFOs air quality impact indicator, a drinking water affordability indicator, as well as a green space accessibility indicator. We also recommend that OEHHA incorporate groundwater levels into the Groundwater Threats indicator. Finally, CRLA requests OEHHA publish an explanation of its significant shifts in regional rankings, particularly within the Central Valley, before finalizing CES 5.0 so that affected communities may review and respond to these changes.

Thank you for considering our comments on Draft CalEnviroScreen 5.0. Please do not hesitate to reach out with any questions.

Sincerely,

California Rural Legal Assistance, Inc., *Unincorporated Community Justice Program*