Project Title: Lubbock Environmental Action Plan (LEAP) for Communities

Applicant Information:

Applicant Organization: Lubbock Compact
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Contact: Joshua Shankles, 575-441-3740, joshua.shankles@gmail.com
DUNS: 064914282

Set-Aside:
Community-Based Organization Set-Aside. Our organization represents constituents and issues throughout the city of Lubbock, TX with particular emphasis on underserved, disadvantaged communities, and communities of color.

Applicant Organization Description:
Lubbock Compact is a 501c3 nonprofit organization whose work is focused around public policy advocacy, community education, and community empowerment.

Project Partners:
Texas Tech University

Community/Support Partners:
NAACP, North Lubbock Neighborhood Association (comprised of: Arnett Benson neighborhood, Jackson-Mahon neighborhood, and Guadalupe neighborhood), Guadalupe Neighborhood Association, Dunbar Neighborhood Association, Yellowhouse Canyon Neighborhood Association, Heart of Lubbock Neighborhood Association, Lubbock Chapter of Citizens Climate Change Lobby, and East Lubbock Art House, TCEQ Remediation Division, Clarity

Project Location: the following neighborhoods/areas in Lubbock, TX:

- Guadalupe Neighborhood
- Chatman-Hill
- Dunbar/Manhattan Heights
- Arnett Benson Neighborhood
- Jackson-Mahon Neighborhood
- Parkway/Cherry Point
- Yellow House Canyon

Air Pollutant Scope
PM 2.5, PM 10

Budget Summary:

EPA Funding Requested	Total Project Cost
$484,899	$484,899

Project Period:
Nov 2022-Dec 2025

Short Project Description:
The Lubbock Environmental Action Project (LEAP) for Communities is a partnership between Lubbock Compact (a local 501c3) and Dr. Karin Ardon-Dryer to install and maintain a network of 40 air monitors over 3 years. This project investigates the potential causes for documented health disparities in target neighborhoods, empowering these residents with the data needed to better advocate for their own health in a century-long struggle for environmental justice.

Section 1: Project Summary and Approach

A. Overall Project

The Lubbock Environmental Action Project (LEAP) for Communities is a partnership between Lubbock Compact (a local 501c3) and Dr. Karin Ardon-Dryer to install and maintain a network of 40 air monitors over 3 years. This project investigates the potential causes for documented health disparities in target neighborhoods, empowering these residents with the data needed to better advocate for their own health in a century-long struggle for environmental justice.

This project supports Goal 4 "Ensure Clean and Healthy Air for All Communities;" Objective 4.1: "Improve Air Quality and Reduce Localized Pollution and Health Impacts" of EPA's Draft FY 2022-2026 Strategic Plan. Our primary focus is investigating the potential links between environmental pollution and the health disparities documented in these East and North Lubbock neighborhoods: Arnett Benson, Jackson-Mahon, Guadalupe, Parkway/Cherry Point, Dunbar/Manhattan Heights, Chatman Hill, and Yellow House Canyon.

As defined by transportation landmarks, our primary areas of interest (see Fig 1) are the areas East of I-27 and interior to E. Loop 289, areas North of Hwy 84 and Hwy 62/82 and interior to N. Loop 289, and the residential areas adjacent to the exterior of East and North Loop 289. Our control group sensors will be located in our secondary areas of interest, as defined by areas interior to Loop 289 (excluding the areas defined as principal area of investigation), and areas South of S. Loop 289 and within city limits.

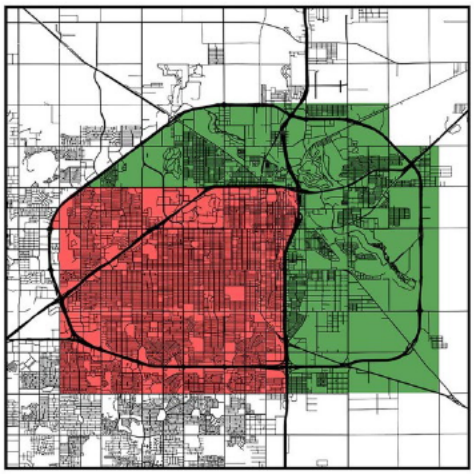

Figure 1 Areas of Interest

The list below offers a concise overview of activities for which the project seeks funding (see appropriate sections for complete budget and timeline):

- 40 Clarity Node-S sensors and reference sensor
- Negotiating access agreements w/ residents to install sensors
- Providing public access to real-time environmental data
- Installing, calibrating, and maintaining sensors
- Quarterly reporting meetings with public
- Engagement with local schools to support women and persons of color aspiring to enter into technical fields (will discuss with schools if awarded)
- Community outreach at neighborhood association meetings
- Social media engagement
- Making technical data understandable and usable for target audience

According to EJScreen data, our target neighborhoods rank in the 80th percentile for limited access to broadband, with some East Lubbock areas ranking in the 95th-99th percentile. Also considering the poverty rates in these areas, reliable monitor uptime requires sensors that are both solar-powered and are able to transmit data via cellular networks. The Clarity Node-S units are currently the only low-cost sensors on the market that meet these requirements. For full non-compete justification, see Section 7.A.

After calibrating all the Clarity Node-S units, we will install the sensors at strategic locations throughout Lubbock (see Fig 2), with an emphasis on locating sensors in North and East Lubbock. Additional sensors will be placed in West and South Lubbock areas to provide control groups far from the industrial zones. Two of the Clarity Node-S units will be collocated with two different reference units to allow not only real-time monitoring for proper sensor behavior, but also provide real-time data crucial for correcting sensor calibrations. Supervised by Dr. Ardon-Dryer, a Ph.D. student dedicated to the project will monitor all the Clarity units, examine the sensor performance, and perform all data analysis.

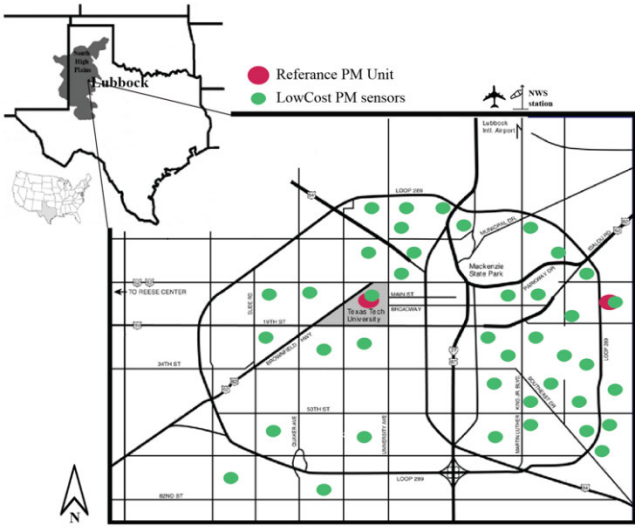

Figure 2 Approximate sensor location

Lubbock currently only has one reference unit that measures $PM_{2.5}$ values located far from residential areas in the east side of town , near a highway and an agricultural field. There are no other sensors in a 100 mile radius, making it impossible to do any significant scientific studies.

Our region is prone to dust events, and there are no PM_{10} measurements currently available for the region. While the Clarity Node-S measurement quality for PM_{10} is still being verified, even generally-accurate measurements in this range will provide a critical method of determining if an increase of PM_{10} or $PM_{10-2.5}$ is due to natural causes (dust storms) or due to anthropogenic sources. By using meteorological measurements (wind speed and wind direction) from the local National Weather Station in tandem with trajectory maps (HYSPLIT), we will be able to identify likely sources of high PM concentrations.

No regional information is available for chemical speciation, and the nearest units from the EPA Chemical Speciation Network (CSN) or the Interagency Monitoring of Protected Visual Environments (IMPROVE) network are hundreds of miles away, leaving our region in a blind spot for existing aerosol monitoring networks. The CDC and TTUHMS health disparity studies demonstrate a clear need for a scientific study of aerosols in potentially vulnerable neighborhoods. To this end, year 2 of our project plan includes identifying 5-10 filter collection sites using data of high PM values collected during year 1. 100 filters will be collected using Harvard Impactor (HI) units already in use by Dr. Ardon-Dryer's lab. The HI units will collect daily PM2.5 particles on filter substrates (Marple et al., 1987[1]) in 24-hour cycles (midnight to midnight). The HIs sample PM2.5 particles at flow rates of 16.7 liters per min, using impactor stages in series with polyurethane foam (PUF) impaction substrates (Lee et al., 2011[2]). The 37-mm filters will be pre- and post-weighed using an electronic microbalance (XRP2U Microbalance, available for use via Dr. Ardon-Dryer's lab) to provide gravimetric measurements. The filter will then be examined for elemental composition and mineralogy at the Texas Tech University College of Arts & Sciences Microscopy (CASM) center by performing a single particle analysis to identify any elemental compositions associated with anthropogenic pollution, such as heavy metals. This critical data will enable future medical studies to establish correlations between exposure levels and the documented health degradation observed in target neighborhoods.

B. Project Significance

The project will benefit neighborhood residents in the following ways:

1. A broad system of $PM_{2.5}$ air monitors will provide real-time data on air quality and exposure rates for residents living in the impacted area, with sensors strategically located in other neighborhoods and next to existing sensors that will serve as control/calibration groups.
2. We will create lasting partnerships between residents and environmental science at Texas Tech, laying the foundation for future community engagement opportunities.
3. All project subject matter experts (SMEs) will work directly with residents to ensure that technical data is successfully understood and made usable for each individual community, which includes information about the impacts of pollution in their neighborhoods. Residents will be able to use this information to decide what, if any,

[1] Marple, V. A., Rubow, K. L., Turner, W., Spengler, J.: Low flow rate sharp cut impactors for indoor air sampling: design and calibration, JAPCA, 37, 1303–1307, https://doi.org/10.1080/08940630.1987.10466325, 1987.
[2] Lee, H. G., Gent, J. F., Leaderer, B. P., Koutrakis, P.: Spatial and temporal variability of fine particle composition and source types in five cities of Connecticut and Massachusetts, Sci. Total Environ., 409, 2133–2142, https://doi.org/10.1016/j.scitotenv.2011.02.025, 2011.

actions are in their best interests. Our SMEs will use their expertise to support communities in pursuing whatever actions they deem appropriate.

The target neighborhoods are predominantly low-income, Black and Hispanic neighborhoods. Only three of our target neighborhoods have poverty rates below 33%, compared to the city-wide average of 20.6%.

Demographics of Project Communities in Lubbock (2015-2019 ACS 5-Year Estimates)				
Census Tract/Neighborhood	% Black (not Hispanic)	% Hispanic	% White (not Hispanic)	% People in Poverty
City of Lubbock as a whole	7%	37%	50%	20.6%
2.02 - Jackson-Mahon	11%	76%	13%	34.4%
3.02 - Arnett Benson	5.%	76%	11%	37%
7 - Guadalupe	1%	86%	14%	16.3%
9 - Parkway/Cherry Point	49%	45%	1%	39.8%
10 - Parkway/Cherry Point	46%	42%	10%	22.9%
12 - Chatman Hill & Dunbar/Manhattan	67%%	26%	6%	33.7%
25 - Yellow House Canyon	10%	65%	22%	24.2%

The race/ethnicity dot density map in Fig. 3 shows the intense level of racial segregation in Lubbock and demonstrates the disproportionate impact of industrial land use on communities of color. Areas shaded purple are slated for industrial use in Lubbock's most recent comprehensive plan, Lubbock Plan 2040. 13 of the 16 Toxic Release Inventory (TRI) sites in Lubbock's city limits are already located near (within 2.5 miles), adjacent to, or situated within the target neighborhoods. Lubbock City Ordinance 223, which was only repealed in 2006, declared that the residents in these neighborhoods, not the industrial sites, were "dangerous to the health" and "pollute the earth and atmosphere." As the 2040 Land Use map demonstrates, City officials would prefer to extend for at least two decades the discrimination of previous policies by further compounding these communities' health burdens from local industry.

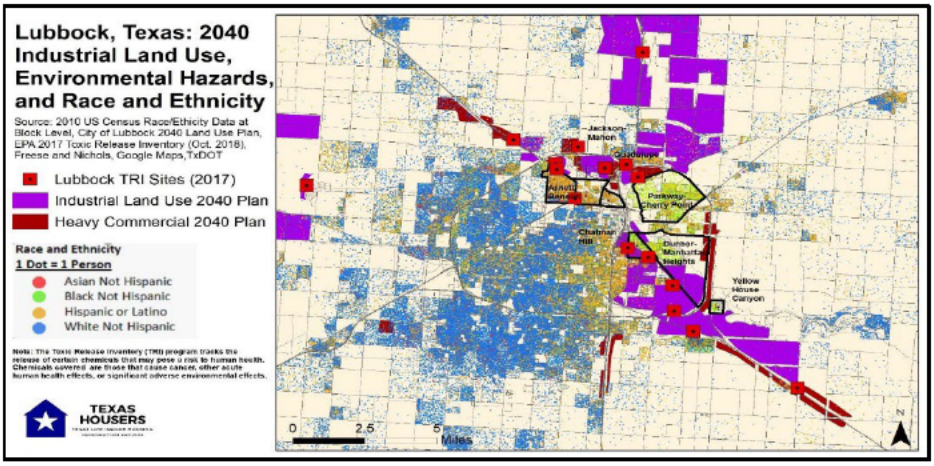

Figure 3 Racial/Ethnicity Dot Density Map

These unjust burdens are the product of racist government practices, starting with a Jim Crow era ordinance passed in 1923 which forced Black Lubbockites to live in the southeastern section of Lubbock. Land use plans passed between 1943 and 2018 surrounded minoritized neighborhoods with industrial zoning and spared areas which were majority-white.[3] Section 3 discusses the consequences of these practices in more detail.

For years, East and North Lubbock residents have spoken out about the impacts on their quality of life caused by asthma and other respiratory problems, foul smells, visible haze clouds drifting from nearby sites, and an oily film which collects on windows and cars.[4] A 2021 study from the Texas Tech University Health Science Center (TTUHSC) found that hospital admissions for severe asthma in Northeast Lubbock were significantly higher than other regions of the city and identified increased rates of air pollution as a potential cause.[5] However, the authors state that future studies, including air monitoring studies, are needed to conclusively understand neighborhood exposures to particulate matter translate to documented health disparities.

[3] 2019 fair housing complaint filed by the Lubbock NAACP, Texas Housers, and Texas Appleseed. https://www.texasappleseed.org/sites/default/files/Lubbock%20Fair%20Housing%20Complaint_12-9-2019.pdf

[4] Audra Brigham, Katie Main, and Mary Onishi, Why is East Lubbock Coughing? The Discriminatory Past and Present of Lubbock's Land Use (December 2018). https://spark.adobe.com/page/i1W4Fv1uEG4Pt/.

[5] Noah de la Cruz, et. al., "Geographic Disparity in Asthma Hospitalizations," (November. 2021), https://www.cureus.com/articles/75199-geographic-disparity-in-asthma-hospitalizations-the-role-of-raceethnicity-socioeconomic-status-and-other-factors?fbclid=IwAR1WRqtzO_mFm1PGTfR1_tu4Z1sfK0lCb5z2MtRVaQ9rEksI9fQRJH5WPf8

Additionally, this region is prone to dust events, averaging 21 per year (Kelley and Ardon-Dryer, 2021)[6]. Yet no information is available about the impacts of dust events in this region on air quality. The sensor network from LEAP will provide the first scientific insights into how these dust events impact air quality and local health disparities. This project's data will provide a critical foundation for future, action-oriented efforts, such as changing city policies, pressuring offending emitters to institute adequate pollution prevention controls, pursuing appropriate remediation/enforcement actions, and designing interventions to reduce the disparities in asthma hospitalizations in our area.

Section 2: Community Involvement

A. Community Partnerships

Our team has all of the expertise needed to gather, analyze, and distribute air monitoring data, but as discussed in Section 2.B, our project cannot and will not decide what is best on behalf of our communities. To this end, we have solicited letters of support from community organizations to demonstrate community buy-in for the project. These partners will not receive grant funding but will participate in the project by encouraging and mobilizing their host communities to attend quarterly reporting meetings, etc.

We chose to solicit neighborhood associations (NA) not because they are the de facto spokesperson for every community member, but because NAs generally represent concentrations of active advocates who live in defined areas and whose organizations have a vested interest in outcomes for that geographic area. They will also play a key project role by helping to distribute findings to their communities and provide residents with internal forums to discuss concerns and develop community action plans based on project data.

Project Manager 2 will survey the community to identify the best platforms and channels to engage with residents, and our quarterly reporting meetings and social media pages will provide residents with direct access to project managers and subject matter experts (SMEs).

The following community organizations have submitted letters of support committing to serve as community advisers to the Project Managers and help direct their efforts; help to coordinate community outreach and education about the project; work with residents to find a place for an air monitor in their neighborhoods, and help volunteers keep consistent records of air quality such as smell, sight, and other observable information: NAACP, North Lubbock Neighborhood Association (comprised of: Arnett Benson neighborhood, Jackson-Mahon neighborhood, and Guadalupe neighborhood), Guadalupe Neighborhood Association, Dunbar Neighborhood Association, Yellow House Canyon Neighborhood Association, Heart of Lubbock Neighborhood Association, Lubbock Chapter of Citizens Climate Change Lobby, and East Lubbock Art House. Other neighborhoods expressed interest in providing support letters but did not submit in time for inclusion in the grant application. While not community partners, the following organizations/agencies have also submitted letters of support: Texas Tech University, Clarity, and TCEQ Remediation Division.

As a final note, we would like to address the need to include so many organizations that do not have a direct role in conducting project duties. The race/class divisions in our community are so deep, the number of failed community projects so many, and the failure of local government to protect these communities so consistent that it has taken the support of all these organizations just to convince community members to mobilize one more time. Even still, many community members have explicitly stated that their trust, their hope, will only be earned by results. Our team is prepared to deliver.

B. Community Engagement

Our community engagement framework was developed in part with guidance from the Community Engagement Principles (2nd edition), developed by the Clinical and Translational Science Awards Consortium (CTSAC) Community Engagement Key Function Committee Task Force. Principles 4 and 8 in particular are the foundation for our team's

[6] Kelley, M.C. and Ardon-Dryer, K.: Analyzing two decades of dust events on the Southern Great Plains region of West Texas, Atmospheric Pollution Research, doi: 10.1016/j.apr.2021.101091, 2021.

policy to provide objective, unbiased data and to take a support role by enabling communities to make their own decisions and empowering them to pursue their own actions: "4. Remember and accept that collective self-determination is the responsibility and right of all people in a community. No external entity should assume it can bestow on a community the power to act in its own self-interest.", "8. Organizations that wish to engage a community as well as individuals seeking to effect change must be prepared to release control of actions or interventions to the community and be flexible enough to meet its changing needs.[7]"

Lubbock's diverse communities have expressed a wide spectrum of goals and motivations. To ensure that our project outcomes empower all communities, including those that support their industry neighbors, we will simply provide objective data, ensure that community members understand the implications of this data, and create a space for discussion in which community members, if they wish, can decide for themselves what actions are appropriate. These discussion sessions will be offered at every quarterly reporting meeting and upon request.

In-person meetings will be held should pandemic conditions allow, but Zoom meetings will be held otherwise. All meetings will be recorded and posted online. To ensure all residents have access to meetings, we will provide printed handouts to neighborhood associations for dissemination and work with neighborhood association volunteers to ensure all interested residents have transportation. All recordings will be transcribed for the hearing-impaired, and all deliverables will be compliant with widely-accepted accessibility standards, such as WCAG 2.1.

C. Community-Based Organization Set-Aside

Lubbock Compact is applying for the Community-Based Organization set-aside. Documentation qualifying LC as a Community-Based Organization is attached as a separate document.

Section 3: Environmental Justice and Underserved Communities

For 100 years, the city of Lubbock has discriminated against predominantly Black and Latino neighborhoods by concentrating industrial uses in and around them. In 1923, the Lubbock mayor signed an ordinance forcing Black residents to live in a designated section in the southeast side of the city.[8] Lubbock's I-27 largely mirrors the western edge of the old ordinance. Lubbock's first land use plan in 1943 zoned the areas around these neighborhoods for industrial land uses, purposely creating a physical barrier of industry to formalize Jim Crow separation of minority and white sections of town. Lubbock's 1959 Land Use Plan continued situating industry near communities of color while at the same time asserting that an ideal neighborhood should be "free from the noxious odors, sounds, and sights of industry." These practices were cemented for a new generation in Lubbock's most recent comprehensive plan passed in 2018. As a result, East and North Lubbock are overburdened with polluting industries.

A study from the Department of Geosciences at Texas Tech found that census blocks with high-density Black populations were located at an average of 568.1 meters closer to toxic releasing facilities than the overall average of all block groups in Lubbock County.[9] As Figure 4 shows, there are strong correlations between proximity to RMP facilities and low-income, minority communities.

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[7] Clinical and Translational Science Awards Consortium Community Engagement Key Function Committee Task Force on the Principles of Community Engagement. NIH Publication No. 11-7782 (June 2011). https://www.atsdr.cdc.gov/communityengagement/pdf/PCE_Report_508_FINAL.pdf

[8] Robert Foster, Black Lubbock: A History of Negroes in Lubbock, Texas, to 1940 109 (December 1974) (unpublished M.A. thesis, Texas Tech University), https://ttu-ir.tdl.org/bitstream/handle/2346/23878/31297000606956.pdf?sequence=2.

[9] Jason Michael Post, "Spatial Environmental Inequality in Lubbock", Texas 43 (May 2014) (unpublished M.S. thesis, Texas Tech University), https://ttu-ir.tdl.org/handle/2346/58599

Figure 4 RMP Facility Proximity (left), People of Color (middle), Low Income (right)

EJ Indices in several block groups in Lubbock's east side register at the 80th percentile or above nationwide for $PM_{2.5}$ concentrations (see Fig. 5).

- Chatman Hill's $PM_{2.5}$ concentration is at the **83st percentile nationwide for $PM_{2.5}$**
- The northern portion of Parkway-Cherry Point is at the **95th percentile for $PM_{2.5}$**
- Block Group 25.001, just south of Chatman Hill, is in the **91st percentile for $PM_{2.5}$** Concentration nationwide. That ***same block group*** is also in the **88th percentile for 2017 Air Toxics Cancer Risk**, the **84th percentile for the 2017 Air Toxics Respiratory Hazard Index**, and the **96th percentile for Ozone**.

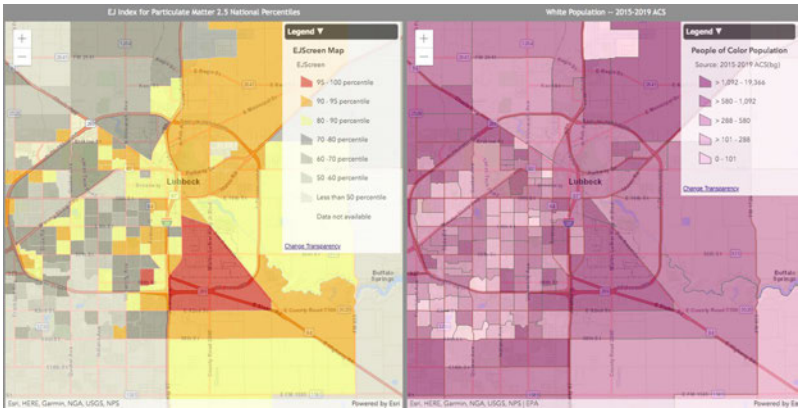

Figure 5 PM2.5 percentiles (left), People of Color Population (right). Darker colors = higher percentiles

Several concrete batch plants border predominantly Hispanic, low-income neighborhoods in North Lubbock. Residents there complain of concrete dust particles covering grass and cars and worry about what they are inhaling. Residents have filed several complaints to authorities, with residents receiving TCEQ investigation reports as recently as October 1, 2021.[10]

- Block Group 3.023 in Arnett Benson, a North Lubbock neighborhood, has a **PM $_{2.5}$ percentile of 84** and an **Ozone percentile of 90**
- Several other block groups in North Lubbock neighborhood have $PM_{2.5}$ percentiles greater than 80. (See Fig. 5)

When the city of Lubbock drafted its new land use plan in 2018, citizens from several neighborhoods joined together to raise their concerns at public hearings.[11] When the city refused to make meaningful changes to the land use map, the Lubbock NAACP, with the assistance of Texas Housers and Texas Appleseed, filed a fair housing complaint against the City of Lubbock for discriminatorily concentrating industrial zoning in Black and Brown neighborhoods. This complaint was ultimately dismissed by the previous administration for lack of jurisdiction.

Section 4: Environmental Results

A. Expected Project Outputs and Outcomes

Outputs:

The outputs for this project are as follows:

- Deployment of a particulate matter (PM) sensor network in strategic areas of Lubbock, focusing on underserved EJ communities.

[10] TCEQ final investigation response, dated October 1,2021. Investigation No.: 1763280, Incident No.: 364107.

[11] Matt Dotray, Citizens ask for delay, more details and enforcement in Lubbock's comprehensive plan, Lubbock Avalanche Journal (October 15, 2018). *See also*: Matt Dotray, In North, East Lubbock citizens hope answers to health concerns go beyond 'Plan Lubbock 2040', Lubbock Avalanche Journal (December 8, 2018).

- Creation of a near real-time air quality dashboard that will report the measured PM from the sensor network to promote public awareness and create actionable reporting.
- Identification and characterization of particulate matter through filtration subsequent to identification of "hotspots" across the sensor network.
- Cultivation of existing partnerships with community-based organizations (and development of others) to facilitate the distribution and dissemination of data collected from the project's sensor network.
- Training community members on both logging observational data and how/when to report observations to TCEQ.
- Development of quarterly and annual progress reports for the project and a final report at its conclusion, all for public distribution.

Outcomes:

Short-term Outcomes (developing knowledge)	Identification of PM concentrations throughout the city of Lubbock, TX.
	Increasing awareness of potential health hazards posed by PM.
	Increased access to real-time and cumulative information as a result of deployment of sensor network.
	Increased engagement in citizen science and public advocacy.
Intermediate Outcomes (developing behavioral changes)	Local policy actions such as zoning and land-use changes, a more robust development planning processes, adoption of an amortization process into Lubbock's Unified Development Code.
	Mitigation actions such as increased buffering and easement between air polluters and residential areas and enhanced mitigation efforts on behalf of emitters. Community and individual mitigation actions such as enhanced air filtration in residences, mask wearing, and landscaping that mitigates the effects of emissions.
	Advocating for introduction of source reduction/pollution prevention activities at emitting facilities
Long-term Outcomes (addressing health disparities)	Reduction of anthropogenic PM in localized atmosphere.
	Reduction of primary diagnosis of severe asthma, allergies, and other respiratory issues in areas with demonstrated health disparities.

B. Performance Measures and Plan

Performance Measures and Plan:

- Facilitating meetings with community partners (with logging of participation).
- Routine maintenance and calibration of equipment (with logging of activities).
- Development of quarterly, annual, and final report of project findings.
- Tracking the development (or lack thereof) of local policy around the issue of air quality.
- Regular oversight and documented communication with vendors of proposed PM sensors.
- Tracking the public usage of real-time air monitoring dashboard.
- Tracking community reporting with TCEQ database

C. Timeline and Milestones

Project Year 1					
Q1			Q2		
Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23
order sensors	delivery and set-up	data collection and analysis			
		colocate and calibrate PM sensors			
		sensor deployment			
	site selection/access agreements				
					real-time air quality site launch
					TCEQ training
					Quarterly reporting to communities

Q3			Q4		
May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23
data collection and analysis					
		Quarterly reporting to communities			Quarterly reporting to communities
					school presentations
					end of year reporting

Project Year 2					
Q1			Q2		
Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24
data collection and analysis					
		determination of "hotspots"			
			collect and filter samples		
		Quarterly reporting to communities			examine filter samples
civic org engagement					TCEQ training
					school presentations and engagement
					Quarterly reporting to communities
Q3			Q4		
May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24
data collection and analysis					
collect and filter samples					
examine filter samples					
		Quarterly reporting to communities			Quarterly reporting to communities
					school presentations and engagement
civic org engagement					end of year reporting

Project Year 3					
Q1			Q2		
Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25
data collection and analysis					
collect and filter samples					
examine filter samples					
		Quarterly reporting to communities			TCEQ training
					school presentations and engagement
civic org engagement					Quarterly reporting to communities
Q3			Q4		
May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25
data collection and analysis					
		Quarterly reporting to communities			Quarterly reporting to communities
			school presentations and engagement		
civic org engagement				civic org engagemen	
					Final Report

Section 5: Quality Assurance Statement

The quality assurance statement is attached separately.

Section 6: Programmatic Capability and Past Performance

A. Past Performance

Lubbock Compact has not received state/federal funds before and is requesting a neutral score for the Past Performance section.

B. Reporting Requirements

Lubbock Compact has not received state/federal funds before and is requesting a neutral score for the Reporting Requirements section.

C. Staff Expertise

CVs for Karin Ardon-Dryer, Joshua Shankles, David Puga, and Justin Hall are attached separately

Section 7: Budget

A. Budget Detail

Line Item and Itemized Cost	EPA Funding
Personnel	
PM1: $25/hr@ 4hr/month base for 36 months + 18hr/quarter + deployment	$11,650.00
PM2: $25/hr@ 8hr/month base for 36 months + 18hr/quarter + deployment	$15,250.00
PM3: $25/hr @ 29hrs quarterly for UCD, documentaton, compliance, meetings	$8,700.00
Total Personnel	**$35,600.00**
Travel	
Mileage for PM1: 35mi/wk @ $.585/mi x 16 weeks + 15 mi/week x 20 weeks (plus 1% inflation)	$720.84
Mileage for PM2: 35mi/wk @ $.585/mi x 16 weeks + 15 mi/week x 20 weeks (plus 1% inflation)	$720.84
Mileage for PM3: 35mi/wk @ $.585/mi x 16 weeks + 15 mi/week x 20 weeks (plus 1% inflation)	$720.84
Total Travel	**$2,162.51**
Equipment	
Reference PM unit	$48,638.00
Total Equipment	**$48,638.00**
Supplies	
Clarity Node S + data license (40units @ $3600 per unit, less $720 discount)	$119,084.94
R drive for backup of data x2	$1,500.00
Pumps for filters for PM characterization x2	$1,000.00
Frame/mount for HI unit	$2,500.00
Filters and filter containers	$150.00
Extension cords x 2	$160.00
Analysis of filter under microscope	$3,500.00
A/V equipment, projector + screen (+1% potential cost increase)	$505.00
Gift cards for monitoring locations x 40 @ $50 value (participation)	$2,000.00
Food for engagement meetings (+1% potential cost increase)	$5,050.00
Gift card raffle for participating neighborhoods x 10 @ $100 value (participation)	$1,000.00
Gift card for households for filter samples x 5 @ $50 value (utility cost reimbursement)	$250.00
School related activities supplies (community investment, education outreach)	$1,000.00
Total Supplies	**$137,699.94**
Contractual	
Accounting Services (estimated) $60/hr x 2hrs/quarter +250/year base	$2,190.00
Payroll Services ($85/month x 36 months)	$3,060.00
Total Contractual	**$5,250.00**
Other	
PI (0.5 month) per TTU requirement for KAD (TTU subaward)	$14,091.00
Ph.D student reseacher coordinator (0.5 month) per TTU requirement (TTU subaward)	$87,163.00
Graduate student tuition and fees per TTU requirement (TTU subaward)	$30,337.30
PI (0.5 month) per TTU requirement for KAD (fringe benefit, TTU subaward)	$4,558.30
Ph.D student reseacher coordinator (0.5 month) per TTU requirement (fringe benefit, TTU subaward)	$19,208.00
Liability Insurance	$2,832.00
Printing	$2,078.64
Website Development	$1,250.00
Web Hosting: $100/year @ 3 years	$300.00
Total Other	**$161,818.24**
Indirect Charges	
TTU F&A	$70,930.10
Lubbock Compact Administrative (5% diminimus of total budget)	$22,800.00
Total Indirect	**$93,730.10**
Total Funding	**$484,898.79**

B. Reasonableness of Cost

PERSONNEL $35,600.00

Salaries for all project managers calculated with a base rate of $25/hour. United Way of Lubbock defines a living wage as $15/hour. This was increased to $25 to account for the technical expertise of the anticipated PMs and attract talent to the project. Estimations of the hours to be expended on the project are based on the project outline provided. Salaries for all university personnel are based upon current Texas Tech University academic and staff salary scales. All personnel budget calculations include salary range adjustments and 3% merit increases as applicable for each year of support in accordance

with published University guidelines. Graduate student support is based on the current University rate for graduate students with an anticipated annual increase of 3% throughout the project.

1. **Project Manager (PM) 1: Joshua Shankles, Principal Project Manager ($11,650)** – will be responsible for overall coordination of the project, scheduling community engagement meetings, reporting to regulatory agencies and subcontractors, supervision of the other project managers, coordination between the project team and community partners.
2. **PM2: David Puga, Assistant Project Manager ($15,250) –** will fulfill the same role as PM1. Coordination and engagement with partnered entities will be divided among these two roles. This PM2 role has an additional 4hrs/month base rate as PM2will also be responsible for development of media pieces (audio, visual, graphics, social media) related to the project.
3. **PM3: Justin Hall, Associate Project Manager ($8,700)** – will assist PM1/2 as necessary, consult on translating technical information from the scientific team for distribution among the lay public, and serve as compliance officer for deliverables and requirements from the EPA and federal guidelines for grant funded projects.

TRAVEL $2162.51

Mileage is calculated based upon the federal allowance of $0.585/mile. Lubbock is an exceedingly geographically sprawling city for its population. Because the sensor network is intended to be deployed across the whole city, 35/miles per week for the deployment phase is anticipated to accommodate for scouting location and deployment at various sites. 15 miles per week for twenty weeks accommodates the community engagement portion of the project to attend various community meetings, school engagements, and/or routine maintenance of the equipment. A 1% adjustment has been added to the calculation to anticipation the possible effects of inflationary pressure between submission of the application and selection for funding.

EQUIPMENT – $48,638.00

One reference unit (T640 PM mass monitor) for PM_{10} and $PM_{2.5}$ with an enclosure ($48,638).

SUPPLIES $137,699.94

- 40 units of Clarity Node S and data license ($119,084.94)
- Two hard drives to backup and protect data from this project: $1500.00
- Two pumps for filter sampling and characterization of PM from "hotspots" in year 2: $1000.00
- Building of frame and mounts for HI units for field deployment at identified "hotspots" for PM: $2500.00
- Filters and filters containers for sampling of PM at identified "hotspots": $150.00
- Extension cords to power pumps for filtering and characterization of PM: $160.00
- Analysis of particle collected on filters using TTU SEM-EDX*: $3500.00
- Portable projector and screen for use in presentations at community engagement Meetings: $505.00
- 40-$50 gift cards to encourage participation in project for monitoring locations for Clarity Node sensors (participant support cost): $2000.00
- Food and refreshments to encourage participation in community education and engagement when presenting reports/findings from the project (participant support cost): $5050.00
- 10-$100 gift cards to raffle within project's partnering organizations to encourage participation and engagement (participant support cost): $1000.00
- 5-$50 gift cards for reimbursement of utility (electric) cost for locations of filter sampling (participant support cost): $250.00
- Paper, refreshments, demonstration materials to be used in engagement with local schools: $1000.00

* Professional Service Agreements- Funds are requested for the use of the SEM-EDS microscope center at Texas Tech University, College of Arts and Sciences Microscopy (CASM). A total of 50 filters will be analyzed. For the use of the CASM facilities, from previous experience, it is estimated that each filter will take about 2h, with a $30 per hour rate for the automated analysis. Coating of the filters with a thin layer of iridium is $10 per coating. A total of $3,500 was designated for this work.

CONTRACTUAL $5,250.00

- A professional, licensed, and accredited accounting service will be obtained through the standard procurement process to manage the drawdown of disbursed funds and ensure compliance to EPA and other regulatory requirements. Represented cost is an estimate as a quotation was unable to be obtained prior to submission of application.
- A payroll service will be obtained through the standard procurement process to manage federal withholding and timely payment of the project managers.

OTHER $161,818.24

- Karin Ardon-Dryer, PhD, Scientific member from TTU ($14,091) – half a month of summer salary is requested for Dr. Ardon-Dryer in each year of the project. Dr. Ardon-Dryer will be responsible for all aspects related to the work with the Clarity Node-S units. Including comparison between the sensors to reference unit, creating correction methods, helping in deployment of sensors, monitor and evaluation of sensor for the duration of the project as well as collection and analysis of filters for elemental composition. Dr. Ardon-Dryer will also supervise the graduate students who will work on this project. She will also be active in the educational and outreach projects as part of the project.
- One TTU Graduate Student, Ph.D. (12 months at 100% effort each year; $87,163)- The graduate student will closely work with Dr. Ardon-Dryer during the research project. The student will be responsible for the performance of comparison, evaluation and monitor each of the Clarity Node-S units during the duration of the project. The student will also be active in the educational and outreach projects as part of the project.
- Tuition and Fee Remission for Graduate Student ($30,337.73) - It is the policy of Texas Tech University (Operating Policy 62.40) to include remission of certain tuition and fees as part of the compensation provided to teaching and research assistants. These costs will be charged in accordance with 2 CFR 200.466 and are excluded from the facilities and administrative cost base. These costs are expected to increase at the rate of 5% per year.
    - TTU FRINGE BENEFITS $23,766.30 ($4,558.30 (KAD)+$19,208.00 (Ph.D))
    - § Employee benefits are directly charged as a percentage of salaries and wages. The rate used for summer salary for faculty is 18% plus health insurance. The rate used for graduate research assistants is 1% plus health insurance. The rate for undergraduate student assistants is 1%. Health insurance is expected to increase by 10% each year.
- Liability insurance will be required to mitigate risk to the project and project team from potentialities that could arise from entering private property and installation of sensor network. Equipment will also be insured against theft and vandalism.
- Printing of distributable materials will be required for dissemination of reported findings on a quarterly basis (as well as annual reports and final reporting).
- A web based "dashboard" will be created using Clarity API that will allow for near real-time access to air quality readings from the sensor network for use by the public.
- An estimate of the cost of webhosting for the dashboard website.

INDIRECT COST (F&A) - $93,730.10

- F&A for TTU is charged at the approved rate of 53% of modified total direct costs (MTDC). MTDC excludes equipment costs (items costing $5,000 or more); graduate student tuition and fee remission; participant support costs, and the amount of each subaward over $25,000.
- Upon approval of the project, Lubbock Compact will apply for a negotiated indirect cost rate with EPA to cover administrative costs. Anything approved over the 5% de minimus value of the total project costs will be considered "in-kind" contributions to the project.

C. Expenditures of Awarded Funds

LC will procure accounting service in compliance with 2 CFR 200 competitive procurement procedures to ensure all aspects of expenditure tracking and reporting requirements are met.