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CITY OF LOS ANGELES

CALIFORNIA



KAREN BASS
MAYOR

**OFFICE OF THE
BOARD OF PUBLIC WORKS**

TJ KNIGHT
ACTING, EXECUTIVE OFFICER

200 NORTH SPRING STREET
ROOM 361, CITY HALL
LOS ANGELES, CA 90012

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<http://bpw.lacity.org>

September 12, 2024

BPW-2024-0401

The Honorable City Council
Room No. 395
City Hall

REQUEST FOR AUTHORITY TO ACCEPT GRANT FUNDING – NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

As recommended in the accompanying report from the Director of the Bureau of Street Lighting, which this Board has adopted, the Board of Public Works (Board) recommends that the City Council:

1. AUTHORIZE the Executive Director of the Bureau of Street Lighting or designee to accept this NASA Grant and execute any necessary agreements in an amount not to exceed \$250,000.00 from NASA for a 2-year period effective May 18, 2023;
2. AUTHORIZE the Bureau of Street Lighting to accept the NASA grant, approve the designation of the Bureau of Street Lighting as the administrative and fiscal agent for the NASA Grant to facilitate receipt and disbursement of grant funds to track and report matching funds, as well as reimburse the city for any grant related expenditures;
3. APPROVE the program grant agreement for the Civil, Human Rights, and Equity Department to assist the city in the NASA Grant implementation in accordance with the terms and conditions set forth in the grant agreement;
4. AUTHORIZE the Controller to transfer and deposit \$250,000 from Fund TBD to the Bureau of Street Lighting Fund 347, Dept. 50, Account TBD;
5. APPROVE \$16,000 reimbursement to the Bureau of Street Lighting for administration costs for monitoring the project, and processing payments to OpenAQ and California State University Los Angeles;

6. APPROVE \$6,400 disbursement to environmental justice partners as directed by Civil, Human Rights and Equity Department for the project's community workshops;
7. APPROVE \$22,000 reimbursement to Civil, Human Rights and Equity Department for the mobilization on the equity outcomes for underrepresented communities;
8. APPROVE \$40,154 reimbursement to the Office of the Mayor for the Finance, Operations and Innovation team to manage the program;
9. APPROVE the program grant agreement between the Bureau of Street Lighting and OpenAQ in the amount of \$41,690 for data platform expertise and completion of air quality data workshops and assist the city in the NASA Grant implementation in accordance with the terms and conditions set forth in the grant agreement; and
10. APPROVE the program grant agreement between the Bureau of Street Lighting and the California State University Los Angeles in the amount of \$123,756 to develop a web-based Visualization Platform for Air Quality and Socioeconomic data based on air quality prediction modeling and assist the city in the NASA Grant.

Fiscal Impact: There is no impact to the General Fund.

Sincerely,

A handwritten signature in black ink, appearing to read 'TJ Knight', with a stylized, cursive script.

TJ KNIGHT,
Acting Executive Officer, Board of Public Works

TK:lc

TRANSMITTAL

TO Board of Public Works	DATE 08/30/2024	COUNCIL FILE NO.
FROM The Mayor	COUNCIL DISTRICT	

REQUEST FOR AUTHORITY TO ACCEPT GRANT FUNDING – NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (BPW REPORT #2024-0401)

Approved, ED3 Waived, and Transmitted for further processing.



MAYOR
(Carolyn Webb de Macias for)

**BOARD OF PUBLIC WORKS
MEMBERS**

AURA GARCIA
PRESIDENT

M. TERESA VILLEGAS
VICE PRESIDENT

DR. MICHAEL R. DAVIS
PRESIDENT PRO TEMPORE

VAHID KHORSAND
COMMISSIONER

SUSANA REYES
COMMISSIONER

CITY OF LOS ANGELES

CALIFORNIA



KAREN BASS
MAYOR

**OFFICE OF THE
BOARD OF PUBLIC WORKS**

TJ KNIGHT
ACTING, EXECUTIVE OFFICER

200 NORTH SPRING STREET
ROOM 361, CITY HALL
LOS ANGELES, CA 90012

TEL: (213) 978-0261
TDD: (213) 978-2310
FAX: (213) 978-0278

<http://bpw.lacity.org>

July 10, 2024

BPW-2024-0401

The Honorable Mayor Bass
City Hall – Room 320
Los Angeles, CA 90012
Attn: Heleen Ramirez

REQUEST FOR AUTHORITY TO ACCEPT GRANT FUNDING – NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

As recommended in the accompanying report from the Director of the Bureau of Street Lighting, which this Board has adopted, the Board of Public Works (Board) recommends that the Mayor and City Council:

1. AUTHORIZE the Executive Director of the Bureau of Street Lighting or designee to accept this NASA Grant and execute any necessary agreements in an amount not to exceed \$250,000.00 from NASA for a 2-year period effective May 18, 2023;
2. AUTHORIZE the Bureau of Street Lighting to accept the NASA grant, approve the designation of the Bureau of Street Lighting as the administrative and fiscal agent for the NASA Grant to facilitate receipt and disbursement of grant funds to track and report matching funds, as well as reimburse the city for any grant related expenditures;
3. APPROVE the program grant agreement for the Civil, Human Rights, and Equity Department to assist the city in the NASA Grant implementation in accordance with the terms and conditions set forth in the grant agreement;
4. AUTHORIZE the Controller to transfer and deposit \$250,000 from Fund TBD to the Bureau of Street Lighting Fund 347, Dept. 50, Account TBD;
5. APPROVE \$16,000 reimbursement to the Bureau of Street Lighting for administration costs for monitoring the project, and processing payments to OpenAQ and California State University Los Angeles;

6. APPROVE \$6,400 disbursement to environmental justice partners as directed by Civil, Human Rights and Equity Department for the project's community workshops;
7. APPROVE \$22,000 reimbursement to Civil, Human Rights and Equity Department for the mobilization on the equity outcomes for underrepresented communities;
8. APPROVE \$40,154 reimbursement to the Office of the Mayor for the Finance, Operations and Innovation team to manage the program;
9. APPROVE the program grant agreement between the Bureau of Street Lighting and OpenAQ in the amount of \$41,690 for data platform expertise and completion of air quality data workshops and assist the city in the NASA Grant implementation in accordance with the terms and conditions set forth in the grant agreement; and
10. APPROVE the program grant agreement between the Bureau of Street Lighting and the California State University Los Angeles in the amount of \$123,756 to develop a web-based Visualization Platform for Air Quality and Socioeconomic data based on air quality prediction modeling and assist the city in the NASA Grant.

Fiscal Impact: There is no impact to the General Fund.

Sincerely,

A handwritten signature in black ink, appearing to read 'TJ Knight', with a stylized, cursive script.

TJ KNIGHT,
Acting Executive Officer, Board of Public Works

TK:lc

ADOPTED BY THE BOARD
PUBLIC WORKS OF THE CITY
of Los Angeles, CaliforniaAND REFERRED TO THE CITY COUNCIL
JUL 10 2024

AND REFERRED TO THE MAYOR

Executive Officer
Board of Public WorksDEPARTMENT OF PUBLIC WORKS
BUREAU OF STREET LIGHTING
REPORT NO. 1

JULY 10, 2024

CD/s: ALL

Honorable Board of Public Works
of the City of Los Angeles**REQUEST FOR AUTHORITY TO ACCEPT GRANT FUNDING FROM THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA) FOR THE PREDICTIVE ENVIRONMENTAL ANALYTICS AND COMMUNITY ENGAGEMENT FOR EQUITY AND ENVIRONMENTAL JUSTICE (PEACE FOR EEJ) PROJECT IN AMOUNT NOT TO EXCEED \$250,000; AUTHORITY TO EXECUTE AN AGREEMENT WITH EACH, OPEN AQ, AND THE CALIFORNIA STATE UNIVERSITY LOS ANGELES (CSULA); AUTHORITY TO APPROPRIATE FUNDS TO BUREAU OF STREET LIGHTING'S (BSL) CONTRACTUAL SERVICES ACCOUNT UPON AVAILABILITY OF FUNDS**

The Bureau of Street Lighting (BSL) requests approval to accept grant funding in an amount not to exceed **\$250,000** for a 2-year period effective May 18, 2023 from the National Aeronautics and Space Administration (NASA). BSL also requests approval to designate BSL as the administrative and fiscal agent for the NASA grant to facilitate the receipt and disbursement of grant funds to track and report matching funds.

The Civil, Human Rights, and Equity Department ("CHRED" or "LA Civil Rights Department") requests approval to assist the City in the NASA Grant implementation.

RECOMMENDATIONS

Recommending the Board of Public Works (Board), subject to Mayor and Council Approval:

1. AUTHORIZE the Executive Director of the Bureau of Street Lighting or designee to accept this NASA Grant and execute any necessary agreements in an amount not to exceed \$250,000.00 from NASA for a 2-year period effective May 18, 2023; and
2. AUTHORIZE the Bureau of Street Lighting to accept the NASA grant, approve the designation of the Bureau of Street Lighting as the administrative and fiscal agent for the NASA Grant to facilitate receipt and disbursement of grant funds to track and report matching funds, as well as reimburse the City for any grant related expenditures; and
3. APPROVE the program grant agreement for the Civil, Human Rights, and Equity Department ("CHRED" or "LA Civil Rights Department") to assist the City in the NASA Grant implementation in accordance with the terms and conditions set forth in the grant agreement; and

4. AUTHORIZE the Controller to transfer and deposit \$250,000 from Fund TBD to the Bureau of Street Lighting Fund 347, Dept. 50, Account TBD; and
5. APPROVE \$16,000 reimbursement to the Bureau of Street Lighting for administration costs for monitoring the project, and processing payments to OpenAQ and California State University Los Angeles (UAS); and
6. APPROVE \$6,400 disbursement to environmental justice partners as directed by Civil, Human Rights and Equity Department for the project's community workshops; and
7. APPROVE \$22,000 reimbursement to Civil, Human Rights and Equity Department for the mobilization on the equity outcomes for underrepresented communities; and
8. APPROVE \$40,154 reimbursement to the Office of the Mayor for the Finance, Operations and Innovation team to manage the program; and
9. APPROVE the program grant agreement between the Bureau of Street Lighting and OpenAQ in the amount of \$41,690 for data platform expertise and completion of air quality data workshops and assist the City in the NASA Grant implementation in accordance with the terms and conditions set forth in the grant agreement; and
10. APPROVE the program grant agreement between the Bureau of Street Lighting and the California State University Los Angeles (UAS) in the amount of \$123,756 to develop a web-based Visualization Platform for Air Quality and Socioeconomic data based on air quality prediction modeling and assist the City in the **NASA** Grant.

TRANSMITTAL(S)

1. Copy of Agreement with OpenAQ
2. Copy of Agreement with CSULA

DISCUSSION

Background

Air pollution is mostly a human-made problem and is known as a silent killer. Every 5 seconds, someone dies from the effects of air pollution, which is responsible for the early deaths of 7 million people every year and 107.2 million disability-adjusted-life-years globally. Concerningly, the percentage of the global population living in urban areas is projected to increase from 54% in 2015 to 68% in 2050 and in the U.S. up to 89%. Preventing a significant increase in air pollution-related loss of life requires comprehensive mitigation strategies, as well as forecast systems, to limit and reduce the exposure to harmful urban air. The pandemic has added to this challenge with long-term effects of COVID on millions more who are struggling to breathe and are facing respiratory complications for the rest of their lives. More than 182 million people have contracted COVID and nearly 4,000,000 have died. The ability to predict air quality, intervene to

mitigate poor air quality activities, and to inform those suffering from respiratory issues is a growing concern for government and health officials worldwide.

According to the American Lung Association¹ and the NIH National Institute of Environmental Health Science,² low-income families and people of color often face higher exposure to air pollutants and experience greater health impacts. Minority and low-income communities tend to be exposed to higher levels of air pollution and impacted most by the adverse health consequences of air pollution and neighborhoods with a high percentage of residents living in poverty tend to have the highest asthma rates including in parts of Los Angeles³.

Los Angeles operates a network of ground-based monitoring stations for ozone and particulate matter (PM). However, the integration of socioeconomic data with ground-based data, satellite data and other Earth observations along with advanced data analytics and machine learning methods can significantly improve the City's understanding of air pollution, enabling the City to predict air pollution and its health effects.

The Predictive Environmental Analytics and Community Engagement system for Equity and Environmental Justice (PEACE for EEJ) project will provide novel and critical air quality and health data for the City of Los Angeles and its 4 million residents by bringing the data to the public in a way that works across communities and cultural differences and specifically analyzes, engages, and responds to needs for environmental justice. While there are currently existing air quality apps that provide and aggregate air pollution values, PEACE for EEJ will provide prediction data through mobile and web-based applications that predict what air quality and associated health impacts will be 5-10 days into the future. Along with the week's forecast, a color-coded rating system will demonstrate whether the air pollution concentration level for today and for several days ahead is safe to breathe based on predictive health impacts (e.g., triggering asthma attacks in vulnerable people).

Not only will the predictive air quality and health data be valuable to LA's residents, but this data will also fill in a gap in existing city air quality data by providing forecasted data that will help the City reach its city-wide sustainability targets in an inclusive and equitable manner.

OBJECTIVE

¹The American Lung Association, "Disparities in the Impact of Air Pollution", April 2020, <https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities>.

² NIH National Institute of Environmental Health Science, "Poor Communities Exposed to Elevated Air Pollution Levels", https://www.niehs.nih.gov/research/programs/geh/geh_newsletter/2016/4/spotlight/poor_communities_exposed_to_elevated_air_pollution_levels.cfm.

³K. Marlis, J. West, D. Comer, I. Burga, J. Taub, C. F. Calvert, J. Holm, and M. Pourhomayoun, "A Comprehensive Analysis of Air Pollution and Equity During COVID-19 in Los Angeles County," The 17th International Conference on Data Science, ICDATA'21: July 26-29, 2021, USA.

The objective of PEACE for EEJ is to increase the accessibility and use of Earth observations and Socioeconomic data for understanding air quality and to integrate it into governmental and health organizations' decision making processes that enhance pollution mitigation strategies and support Equity and Environmental Justice initiatives.

To accomplish this objective, PEACE for EEJ will integrate socioeconomic data with ground-based data, satellite data and other Earth observations along with advanced data analytics and machine learning methods to enable us to improve our understanding of air pollution and better predict air pollution and its health effects. This will also enhance the City's capabilities to better manage air pollution and most importantly to support the most vulnerable communities that tend to be exposed to higher levels of air pollution and its health consequences.

The specific aims of this project are:

1. Integrating Earth observations with socioeconomic data to identify and support the neighborhoods and communities that face higher exposure to air pollutants and experience greater health impacts.
2. Developing data analytics, machine learning, and deep learning algorithms for understanding and predicting main air pollution sources and patterns including PM2.5, ozone, NOx, CO, PM10, and other air pollutants and use it for sustainable decision making at the city level.
3. Developing predictive models for health risk management using deep learning and machine learning to understand and predict the impact of air pollution on human health outcomes for city-level decision making to enhance equity and environmental justice.
4. Creating web and mobile applications to be used by the general public, healthcare providers, and city planners/decision-makers to get information about future air pollution, visualize the prediction results, and understand the future health effects and risks in advance.
5. Creating open source models for cities to help air pollution management and decision making with shared attributes to enhance equity and environmental justice.
6. Engaging key stakeholders to provide feedback and enable co-creation for improved usability and design of the mobile app, web app, and dashboards including hosting workshops and meetings for community-based organizations, healthcare providers, tech developers, and air pollution, COVID, and health experts.

MOBILE APP, WEB APP, AND DASHBOARD

One of the main goals of this project is to develop effective ways for people to understand complex data in actionable ways. This will include development of a web app and mobile app, and dashboard to visualize the prediction results, provide information about air quality forecasting, provide information about possible health risks/consequences, and create alerts/warnings. These tools can be used by the general public, healthcare providers, and policy makers and EEJ focused organizations to get informed about future air pollution/quality and health effects and risks

Unlike other existing frameworks, the proposed mobile app and dashboard will provide the prediction results for both future air quality and future health risks (calculated by the predictive models mentioned in previous sections). It will also create alerts/warnings in advance and give recommended actions based on predicted levels of air pollution and predicted health risks for each group of people.

COLLABORATORS AND CONSULTANTS

This project is a collaboration between the City of Los Angeles, California State University Los Angeles, and OpenAQ. The team for this task includes a diverse and deep set of experiences and expertise in the design, implementation, and management of systems and policies from NASA, Cities, and other Federal and international activities as applied to a large and diverse City.

City of Los Angeles

- *The City of Los Angeles* will be the primary organization to provide operational, sustained deployment of the mobile app and data feeds and uses from this proposal. In coordination with the other partners below, the City will be able to utilize this data for improved public health, better decisions for operational needs, and continue to provide that data to the public through the mobile and web app.
- *Los Angeles Mayor's Office of Sustainability* is a designated recipient of the technology and analysis from this proposal, represented by Dawn Comer, Deputy Mayor Jeanne Holm, and Air Quality Advisor Paul Lee.
- *The Civil, Human Rights and Equity Department* will mobilize on the equity outcomes for underrepresented communities that often face the higher proportion of health challenges. The analysis will both be shaped by and inform the Department's equity and environmental justice initiatives for a sustainable impact.

Data Source Partner

- *OpenAQ* is a Co-I in providing open source ground sensor data and will help to ensure that data, models, and algorithms are distributed as widely as possible to the air quality community to maximize use of NASA data and models. They will facilitate the workshops to engage environmental justice organizations, leveraging from an initial workshop they facilitated during this team's Predicting What We Breathe project.

NASA Earth Science Partner

- The *NASA Citizen science* program will be able to capitalize on and use the mobile and web app and learnings from their for ongoing engagement, particularly with underserved communities around environmental justice.
- *Jet Propulsion Laboratory* is a designated recipient of the technology with specific applicability to the MAIA mission to be launched in 2022.

Other Organizations

- *South Coast Air Quality Management District (SCAQMD)* provides a strategically deployed sensor network across the City of Los Angeles, monitoring air quality and optimizing regional data collection schemes.
- *100 Resilient Cities* sister city program will be used to validate applicability beyond Los Angeles (the City of Los Angeles is a designated member).
- *C40 Cities* provides methods and techniques for air quality monitoring and measurements that can be used by cities (the City of Los Angeles is a designated member).

GRANT AWARD BUDGET

The total budget for this project is \$250,000 over two years inclusive of partners and collaborators.

City of Los Angeles

The Principal Investigator will be managing the task and will spend considerable time working on ensuring that the project is delivered on time, on budget, and that the technologies mature to the level intended. Further the PI will ensure that the partnerships with the intended recipients stays aligned so that the outcomes of the research are useful and used by the recipients as planned. This effort is expected to be 0.25 of the PI's time over the next two years. The Co-I, Jeanne Holm, will be working at 0.25 over the two-year engagement. This cost is also being paid for directly by the City of Los Angeles and waived for this proposal due to the City's commitment to the project. This work will include identifying and providing City-specific air quality, socio-economic and equity index data, coordinating with City departments for decision making elements, supporting the creation of data visualizations, serving as the end-to-end engineer to ensure viability of the set of models, algorithms, and data generated. The City will also have a junior project manager/data analyst working at 0.5 to support the work. \$69,000 has been allocated for personnel costs.

The project will engage key community organizations to participate in design workshops to ensure usability. The City has allocated a community engagement stipend of \$6,400 to support community-based organization (CBO) workshop participation, \$2,891 for travel and \$6,263 for indirect costs. The total City of Los Angeles budget is \$84,554.

California State University Los Angeles (CSULA)

Co-I Mohammad Pourhomayoun is an Associate Professor of Computer Science and the founder and director of Artificial Intelligence and Data Science Research Lab at California State University Los Angeles (CSULA). Co-I Pourhomayoun will be responsible for the project coordination at California State University Los Angeles. Dr. Pourhomayoun will contribute his expertise and full effort in designing and developing the proposed algorithms and the preparation of high-quality manuscripts for publication in the field of data science and AI. He will be responsible to communicate with collaborators at LA City and NASA for assuring the achievement of the proposed research objectives at CSULA side.

Co-I Pourhomayoun will be dedicated to 25% effort for the summer and 10% effort during the academic year for two years (equivalent to \$22,639 for each year). Salary rate is based on PI's current appointed Academic Year (AY) salary rate. Also, a faculty fringe benefit rate of 17% is applied to the summer salary for the Co-I (equivalent to \$3,849 for each year).

Other Personnel: Computer science students and research team: One graduate student for the first year, and 50% time of a postdoc or research associate for the first and second year are budgeted for this project. Also, five undergraduate students will be involved in the project as a senior design team. They will play an important role in research progress and the achievement of the project objectives. The students and research team will work closely under the supervision of the PI and Co-I in development, end-to-end integration, and testing of the major components described in the proposal. They will be involved in system design and development, back-end development and data processing, machine learning, and predictive analytics. The graduate student will receive \$15,000, and the cost for the postdoc/research associate will be \$40,000 total for 2 years.

Other Cost: Travel and Supplies: Attending project-related meetings and conferences, as well as presenting research findings, is an important aspect of research academia. We plan for at least two travels throughout the project lifetime. The estimated amount of \$2,000 per year is budgeted for travel expenses to attend relevant conferences and workshops and present findings. This includes participation in related conferences and ESTO and/or AIST required project meetings. The budget includes \$4,000 cost of cloud-based computational frameworks (AWS) for data processing, analytics, and machine learning for the project.

OpenAQ

OpenAQ's services include 0.05 FTE staff time over two years for data access issues, requests, and technical assistance (total \$13,000); and .1 FTE for general support and for facilitating the design thinking workshop in Year 1, dropping to 0.05 FTE in Year 2 (total \$21,900). The workshop will occur toward the latter part of Year 1 and will ensure that the data and analysis is understood and able to be applied as intended by the recipients of the data. OpenAQ also charges a de minimus fee for our data platform infrastructure, at \$2,000 per year for this project. Including indirect costs, the total for all components for OpenAQ for two years is \$41,690.

FISCAL IMPACT

There is no additional impact to the General Fund in the current year with the approval of the above recommendation. The recommendation in this report is consistent with the City's Financial Policies.

Respectfully submitted,



Miguel Sangalang
Executive Director
Bureau of Street Lighting

AGREEMENT BETWEEN
THE CITY OF LOS ANGELES
AND
OPENAQ

Regarding: Predictive Environmental Analytics and Community
Engagement for Equity and Environmental Justice
(PEACE for EEJ)

Agreement Number: _____

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**AGREEMENT BETWEEN
THE CITY OF LOS ANGELES
AND
OPEN AQ
FOR
PREDICTIVE ENVIRONMENTAL ANALYTICS AND COMMUNITY ENGAGEMENT FOR EQUITY AND
ENVIRONMENTAL JUSTICE (PEACE FOR EEJ)**

THIS AGREEMENT is made and entered into by and between the City of Los Angeles, California, a municipal corporation (hereinafter referred as the “City”), and OpenAQ, a Washington, DC-based non-profit organization (hereinafter referred as OpenAQ or “Contractor”), with a business location in Washington, DC.

RECITALS

WHEREAS, the City proposes to increase the accessibility and use of Earth observations and Socioeconomic data for understanding air quality and to integrate it into governmental and health organizations’ decision-making processes that enhance pollution mitigation strategies and support Equity and Environmental Justice initiatives; and

WHEREAS, the City will complete this air quality research through a grant from NASA which will aid to inform the City’s Resilient LA and Sustainability plans on improving air quality by taking steps to reduce air pollution; and

WHEREAS, the BSL has accepted accept the grant from NASA and designated the BSL as the administrative and fiscal agent for the grant to facilitate receipt and disbursement of grant funds, track and report matching funds, as well as reimburse the City for any grant-related expenditures; and

WHEREAS, the Contractor will help provide and identify ground monitoring air quality data, providing additional sources, as feasible and available.

WHEREAS, the Contractor has provided their harmonized data sets from their open data platform (including 10,000 government and research stations from 70 countries) through prior grant work; and

WHEREAS, the Contractor has, through prior grant work, hosted regional and global data workshops with air quality stakeholders; and

WHEREAS, the parties hereto wish to enter into an Agreement pursuant to which the Contractor will again provide their open data platform and conduct two stakeholder workshops with the City and community based environmental justice organizations.

NOW THEREFORE, in consideration of the above promises and of the terms, covenants and considerations set forth herein, the parties do agree as follows:

1.0 PARTIES TO THE AGREEMENT AND REPRESENTATIVES

1.1 Parties to the Agreement

The parties to this Agreement are:

- a. City – The City of Los Angeles, a municipal corporation, acting by and through the Bureau of Street Lighting, having its principal office at 1149 South Broadway, #200, Los Angeles, California 90015.
- b. Contractor – OpenAQ, a 501(c)(3) non-profit organization, having its business address at 4301 50th Street NW, Suite 300 PMB 1046, Washington, DC 20016 and whose team works remotely.

1.2 Representatives to the Agreement

The representatives of the parties who are authorized to administer this Agreement to whom formal notices, demands, and communications will be given are as follows:

- a. The City's representative is, unless otherwise stated in the Agreement:

Matthew Hale, Deputy Mayor
City of Los Angeles
Mayor's Office of Finance & Innovation
200 North Spring Street
Los Angeles, CA 90012

with copies to:

Dawn Comer, Executive Offer
City of Los Angeles
Mayor's Office of Finance & Innovation
200 North Spring Street
Los Angeles, CA 90012

and

Bureau of Street Lighting Contract Administration
1149 S Broadway #200
Los Angeles, CA 90015
Attention: Megan Hackney

- b. The Contractor's representative is, unless otherwise stated in the Agreement:

Chris Hagerbamer, Executive Director
 OpenAQ
 4301 50th Street NW, Suite 300 PMB 1046
 Washington, DC 20016

1.3 Formal Notices

Formal notices, demands, and communications to be given hereunder by either party must be made in writing and may be affected by personal delivery or by registered or certified mail, postage prepaid, return receipt requested and will be deemed communicated as of the date of mailing.

1.4 Notices of Change

If the name of the person designated to receive the notices, demands or communications or the address of such person is changed, written notice will be given in accordance with this Section, within five (5) business days of said change.

1.5 Conditions Precedent

- a. **Insurance Requirements.** The Contractor shall comply at all times with all of the insurance requirements set forth in the City of Los Angeles, Standard Provision for City Contracts,
- b. **Changes to Documentation.** Changes to the foregoing documents affecting the performance of the Contractor under this Agreement shall receive City approval in writing before the Contractor may affect the change.
- c. **Contract Assignment.** This contract is not to be assigned to a substitute contractor, a successor in interest, or a purchaser of the contract without express permission of the City. If the City does not approve or grant permission to be a subsequent contractor to assume the services outlined in this contract, then the contract will be terminated.

2.0 TERM OF AGREEMENT

The term of Agreement shall be from May 1, 2023, through August 31, 2025. Said term is subject to the termination provision contained in this Agreement.

3.0 SERVICES TO BE PROVIDED

- 3.1 As referenced in Exhibit 1, "Scope of Work", which is attached hereto and incorporated by reference, the Contractor will provide air quality data from the reference monitors and air sensors on their platform, which are harmonized into one data format. As feasible, the Contractor may add additional data sources ("refresh data") and provide these additional sources. To note: This agreement does not cover building additional adapters to the Contractor Platform.
- 3.2 The Contractor will ensure identified data is available via their open-source platform and provide user-requested data from the platform via csv files or json. The Contractor can additionally provide support to users on how to use the OpenAQ Explorer to explore

data on the Contractor's Platform and to access and implement existing open-source tools built on top of the Contractor's Platform.

- 3.3 The Contractor will lead one (1) regional community workshop during the first year and assist the City with one (1) workshop at the culmination of the project.

Regional Workshop: This workshop will engage community collaborators to focus on the use of data to address community environmental challenges. The workshop will socialize the developed system and models with various community and regional end users who have been identified and with whom the team will likely be engaging, to receive feedback on the tool design, applicability and usefulness for identifying prevention measures for communities that may be adversely affected by health challenges. Groups that focus in environmental justice neighborhoods or represent those who are minorities, immigrants, poor, and elderly will be prioritized.

Culmination Workshop: This workshop will showcase local/regional engagement, socialize and share models with equity and environmental justice decision makers, promote the open-source components, and finalize the user interface and visualization tools.

- 3.4 The Contractor will provide all necessary information, including synthesis of outcome and key findings from the workshops, for required reports during the duration of the project.
- 3.5 The Contractor will provide expenditure reports and invoicing during the duration of the project.

3.6 Service Delivery

The Contractor shall provide the data analysis and services based on the following schedule:

Task #	Tasks	Start	Duration
Task 3.1	Data identification and refresh	Second Quarter of 2023	Third Quarter of 2023
Task 3.2	Publish/update open source	Second quarter 2025	One quarter
Task 3.3	Conduct OpenAQ EEJ community workshop	Fourth quarter 2025	One Quarter
Task 3.4	Help design and run culmination workshop	Second quarter 2025	One quarter

4.0 COMPENSATION AND METHOD OF PAYMENT

4.1 Compensation

The City shall pay the Contractor for the satisfactory performance of the terms and conditions of this Agreement a total amount not to exceed \$41,690, payable per 2 CFR 200.201, according to completion of the milestones in the table below.

Timeframe	Estimated Amount	Task
May 2023 - May 2024	\$25,220	Data platform expertise and completion of Community workshop
June 2024 - Aug 2025	\$16,470	Data platform expertise and completion of culmination workshop
Total	\$41,690	

4.2 Method of Payment

Invoices

The City shall pay the Contractor in accordance with Section 4.1 above and the other conditions and provisions of this Section after receipt and approval of the Contractor's invoices by the City. To ensure that services provided under personal services contracts are measured against services as detailed in the contract, the Controller of the City of Los Angeles has developed a policy requiring that specific supporting documentation be submitted with invoices.

Billing & Invoicing Requirements

The Contractor is required to submit invoices that conform to City standards and include, at a minimum, the following information:

1. Name and address of the Contractor
2. Name and address of City department being billed
3. Date of invoice and period covered
4. Contract number
5. Description of completed task and amount due for tasks including:
 - a. Name of personnel working on tasks
 - b. Hours spent on task and timesheet supporting changes (if applicable)
 - c. Rate per hour and total due
6. Certification by Contractor
7. Discount and terms (if applicable)
8. Remittance Address (if different from company address)

All invoices shall be submitted on the Contractor's letterhead, contain the Contractor official logo, or other unique and identifying information such as the name and address of the contractor. Evidence that tasks have been completed, in the form of a report, brochure, or photograph, shall be attached to all invoices. Invoices shall be submitted within 30 days of service, or monthly, and shall be payable to the Contractor no later than 30 days after City

approval of a complete invoice. Invoices are considered complete when appropriate documentation or services are signed off as satisfactory by the City's Contract Manager.

Invoices and supporting documentation shall be prepared at the sole expense and responsibility of the Contractor. The City will not compensate the Contractor for costs incurred in invoice preparation.

The City may request, in writing, changes to the content and format of the invoice and supporting documentation at any time. The City reserves the right to request additional supporting documentation to substantiate at any time. Failure to adhere to these policies may result in nonpayment or non-approval of demands, pursuant to Charter 262(a), which requires the Controller to inspect the quality, quantity, and condition of services, labor, materials, supplies, or equipment received by any City office or department, and approve demands before they are drawn on the Treasury.

The Contractor understands that the City makes no commitment to fund this Agreement beyond the terms set herein.

Invoices must be e-mailed to:

Megan Hackney
Bureau of Street Lighting
City of Los Angeles
1149 S Broadway #200
Los Angeles, California 90015
megan.hackney@lacity.org

5.0 OWNERSHIP AND INTELLECTUAL PROPERTY RIGHTS

5.1 Intellectual Property Warranty

The Contractor represents and warrants that its performance of all obligations under this Agreement does not infringe in any way, directly or indirectly, upon any third party's intellectual property rights, including, without limitation, patents, copyrights, trademarks, trade secrets, and rights of publicity.

5.2 Ownership of Collected Data

The Parties agree that the Contractor has no ownership of, and acquires no rights in the data collected pursuant to this Agreement. As between the Parties, City retains all right of ownership, title, and interest in and to City data, including all intellectual property rights therein.

5.3 Survival of Provisions

The provisions of this Section shall survive expiration or termination of this Agreement. Further, the rights and remedies are cumulative of those provided for elsewhere in this Agreement and those allowed under the laws of the United State, the State of California, and the City of Los Angeles.

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Information, documents, records, software programs, and data furnished to the Contractor by the City and other documents to which the Contractor has access during the term of this Agreement are confidential information (herein after referred to as "Confidential Information"). The Contractor may not disclose Confidential Information in any manner without the prior written consent of the City.

7.0 AMENDMENTS

Any change in the terms of this Agreement must be incorporated into this Agreement by a written amendment properly executed and signed by the person authorized to bind the parties thereto.

8.0 RATIFICATION

Due to the need for the Contractor's services to be provided expeditiously, the Contractor may have provided services prior to the execution of this Agreement. To the extent that the Contractor's services were performed in accordance with the terms and conditions of this Agreement, those services are hereby ratified.

9.0 STANDARD PROVISIONS

9.1 Standard Provisions for City Contracts

The Contractor shall comply with the applicable requirements of the Standard Provisions for City Contracts (Rev. 9/22)[v.1], attached hereto as Appendix A and incorporated herein by this reference.

9.2 Disclosure of Border Wall Contracting Ordinance

The CONTRACTOR shall comply with Los Angeles Administrative Code Section 10.50 et seq., 'Disclosure of Border Wall Contracting.' CITY may terminate this AGREEMENT at any time if CITY determines that CONTRACTOR failed to fully and accurately complete the required affidavit and disclose all Border Wall Bids and Border Wall Contracts, as defined in LAAC Section 10.50.1.

10.0 ENTIRE AGREEMENT

- a. This AGREEMENT integrates all the terms and conditions mentioned herein or incidental hereto, and supersedes all negotiations or previous agreements between the parties with respect to the performance of the services under this AGREEMENT.
- b. No oral agreement or conversation with any officer or employee of either party shall affect or modify any of the terms and conditions contained in this AGREEMENT.
- c. This AGREEMENT may be executed in one (1) or more counterpart(s), and by the parties in separate counterparts, each of which when executed shall be deemed to be an original but all of which taken together shall constitute one and the same AGREEMENT. The parties further agree that facsimile signatures, or signatures scanned into portable document format (PDF) or another electronic format designated by CITY and sent by e-mail, shall be deemed original signatures.

d. In the event of any inconsistency between the provisions contained in the body of this AGREEMENT and the exhibits attached hereto, the inconsistency shall be resolved by giving precedence in the following order: 1) the provisions contained in the body of this AGREEMENT; 2) Exhibit 1, "Scope of Work"; and 3) Attachment A, "Standard Provisions for City Contracts (Rev. 9.22) [v.1]."

(Signature Page to Follow)

IN WITNESS THEREOF, the parties hereto have caused this Agreement to be executed by their respective duly authorized representatives.

CITY OF LOS ANGELES, by and through its
Department of Public Works
Bureau of Street Lighting

OpenAQ

By signing below, the signatory attests
that they have no personal, financial,
beneficial, or familial interest in this contract.

By: _____
AURA GARCIA
President
Board of Public Works

By: _____
Chris Hagerbaumer
Executive Director

Date: _____

Date: _____


By: _____
MIGUEL SANGALANG
Executive Director
Public Works Street Lighting

By: _____
[INSERT NAME]
[Insert Title]

Date: 06/27/2024

Date: _____

APPROVED AS TO FORM:

HYDEE FELDSTEIN SOTO
City Attorney

ATTEST:

HOLLY L. WOLCOTT
City Clerk

By: _____
TANEA YSAGUIRRE
Deputy City Attorney

By: _____
Deputy City Clerk

Date: _____

Date: _____

* Approved signature methods for corporations:

- 1) Two signatures: One of the Chairman of the Board of Directors, President, or Vice-President, and one of the Secretary, Assistant Secretary, Chief Financial Officer, or Assistant Treasurer, or
- 2) One signature of a Corporate-designated individual together with a properly attested resolution of the Board of Directors authorizing the individual to sign.

EXHIBIT 1: Scope of Work

Scope of Work: Predictive Environmental Analytics and Community Engagement for Equity and Environmental Justice (PEACE for EEJ)

City of Los Angeles Bureau of Street Lighting, OpenAQ

Background

Air pollution is mostly a human-made problem and is known as a silent killer. Every 5 seconds, someone dies from the effects of air pollution, which is responsible for the early deaths of 7 million people every year and 107.2 million disability-adjusted-life-years globally. With the percentage of the global population living in urban areas projected to increase from 54% in 2015 to 68% in 2050 and in the U.S. up to 89%, the prevention of a significant increase in air pollution-related loss of life requires comprehensive mitigation strategies, as well as forecast systems, to limit and reduce the exposure to harmful urban air. The pandemic has added to this challenge with long-term effects of COVID on millions more who are struggling to breathe and are facing respiratory complications for the rest of their lives. More than 182 million people have contracted COVID and nearly 4,000,000 have died. The ability to predict air quality, intervene to mitigate poor air quality activities, and to inform those suffering from respiratory issues is a growing concern for government and health officials worldwide.

According to the American Lung Association and NIH National Institute of Environmental Health Science [1]-[2], poor families and people of color often face higher exposure to air pollutants and experience greater health impacts. Our recent study on the people of California demonstrates that minority and low-income communities tend to be exposed to higher levels of air pollution and hit hardest by the adverse health consequences of air pollution [3]. Our results show that the neighborhoods with a high percentage of residents living in poverty tend to have the highest asthma rates [3]. Figure 1 demonstrates the results by comparing the Asthma rate by neighborhood with Poverty percentage by neighborhood in Greater Los Angeles [3].

Some megacities like Los Angeles operate a network of ground-based monitoring stations for ozone and particulate matter (PM) 2.5. However, the integration of socioeconomic data with ground-based data, satellite data and other Earth observations along with advanced data analytics and machine learning methods can significantly improve our understanding of air pollution, enable us to predict air pollution and its health effects. This will also enhance our capabilities to manage air pollution and most importantly to support the most vulnerable people, including minority and low-income communities that tend to be exposed to higher levels of air pollution and its health consequences.

The solution to some of this is the creation of **Predictive Environmental Analytics and Community Engagement system for Equity and Environmental Justice (PEACE for EEJ)**. The objective of *PEACE for EEJ* is to increase the accessibility and use of Earth observations and Socioeconomic data for

understanding air quality and to integrate it into governmental and health organizations' decision-making processes that enhance pollution mitigation strategies and support Equity and Environmental Justice initiatives. We propose the development of advanced data analytics algorithms, machine learning (ML)-based models, and user interfaces (UIs) that link Socioeconomic data with ground-based in-situ and space-based Earth observations to (a) identify, discover, and classify patterns in urban air quality, (b) enable the forecast of air pollution events for air quality management, air pollution deduction, and decision making, (c) understand the impact of air pollution on people's health and predict individuals' health risks related to air pollution for decision making, (d) identify and support the neighborhoods and communities that face higher exposure to air pollutants and experience greater health impacts, and (e) provide information about air pollution predictions and future health effects/risks through a mobile application and a web dashboard. In short, providing decision makers and EEJ focused organizations with air quality data to support further partnership on decision making on policies that support interventions.

The *PEACE for EEJ* project will provide novel and critical air quality and health data for the City of Los Angeles and its 4 million residents by bringing the data to the public in a way that works across communities and cultural differences and specifically analyzes, engages, and responds to needs for environmental justice. While there are currently existing air quality apps that provide and aggregate air pollution values, *PEACE for EEJ* will provide prediction data through mobile and web-based applications that predict what air quality and associated health impacts will be 5-10 days into the future. Along with the week's forecast, a color-coded rating system will demonstrate whether the air pollution concentration level for today and for several days ahead is safe to breathe based on predictive health impacts (e.g., triggering asthma attacks in vulnerable people).



Figure1. Left: Asthma Rate By Neighborhood. Right: Poverty Percentage By Neighborhood.

Project Plan

The objective of this project is to increase the accessibility and use of space data by using machine learning to help cities predict air quality in ways that can be acted upon to improve human health outcomes and provide better data to individuals and cities. Secondly, the goal is to provide these tools and algorithms to future Earth science missions (e.g., MAIA) to provide rapid ground truth, combine multiple data sources, and support more rapid use of mission data.

This project will focus on maturing the technologies involved in:

- Developing machine learning algorithms for predictive models for air quality based on PM2.5 and other air pollutants
- Build a big data analytics algorithm for integrating ground and space data
- Provide predictive models for health risk using deep learning and machine learning
- Build an open source PM2.5 stack for integrating ground and space data
- Create a model for cities with shared attributes to understand predictions and effective interventions

This work contributes to the state of knowledge in several specific ways.

- The application of machine learning models will allow the processing of big data with complexity of velocity, veracity, and volume in a human understandable way and at actionable speed
- The set of infusion partners gathered will provide actions that will demonstrably improve human health and outcomes, as well as commercialization of the technology
- Combining in-situ ground data and satellite data with machine learning allows us to create wide areas of ground truth and fidelity. This has implications for providing ground to orbital measurements and validation of flight hardware against ground truth.

Projects Tasks and Timeline

Task	Year1					Year2					Task Owner
Convene EJ partners and communities		X			X			X		X	City
Data identification and refresh	X	X	X	X							OpenAQ, CSULA, City
Identify models and select data architecture		X	X	X	X	X	X				CSULA
Migrate data to platform				X	X		X	X	X		CSULA
Data preprocessing	X	X	X	X	X	X					CSULA
Develop ML algorithm			X	X	X	X	X	X	X		CSULA
Identify interventions, socio-economic conditions and EJ policies and priorities for the City			X	X		X			X		City
Prepare mobile app wireframes				X				X	X		City
Conduct training runs			X	X	X	X	X	X			CSULA
Conduct pre- and post-interventions					X			X	X	X	City
Create mobile/web apps						X	X	X	X	X	CSULA/City
Validate algorithm and evaluate for bias						X	X	X	X	X	City/CSULA
Final ML model refinement							X	X	X	X	CSULA
Publish/update open source										X	OpenAQ
Conduct OpenAQ EEJ community workshop				X							OpenAQ
Culmination workshop										X	City of LA, OpenAQ

MEMORANDUM OF UNDERSTANDING

UNIVERSITY PARTNER: Cal State LA University Auxiliary Services, Inc.

Regarding: Predictive Environmental Analytics and
Community Engagement for Equity and
Environmental Justice (PEACE for EEJ)

Agreement Number: _____

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**AGREEMENT BETWEEN
THE CITY OF LOS ANGELES
AND
CAL STATE LA UNIVERSITY AUXILIARY SERVICES, INC. (UAS)
FOR PREDICTIVE ENVIRONMENTAL ANALYTICS AND COMMUNITY ENGAGEMENT FOR EQUITY AND
ENVIRONMENTAL JUSTICE (PEACE FOR EEJ)**

THIS AGREEMENT is made and entered into by and between the City of Los Angeles, California, a municipal corporation (hereinafter referred as the “City”), acting by and through its Bureau of Street Lighting (“BSL”), and Cal State LA University Auxiliary Services, Inc., a non-profit corporation under the laws of the State of California (hereinafter referred as the “Contractor”), located on the campus of California State University, Los Angeles (hereinafter referred as the “University”).

RECITALS

WHEREAS, the City proposes to increase the accessibility and use of Earth observations and Socioeconomic data for understanding air quality and to integrate it into governmental and health organizations’ decision making processes that enhance pollution mitigation strategies and support Equity and Environmental Justice initiatives; and

WHEREAS, the City will complete this Air Quality research through a grant from NASA which will aid to inform the City’s Resilient LA and Sustainability plans on improving air quality by taking steps to reduce air pollution; and

WHEREAS, the proposed work builds upon previous air quality research and analysis completed by this Contractor from a previous NASA grant; and

WHEREAS, the BSL accepted a grant from NASA and designated the BSL as the administrative and fiscal agent for the grant to facilitate receipt and disbursement of grant funds, track and report matching funds, as well as reimburse the City for any grant-related expenditures; and

WHEREAS, the grant requires the City to partner with an academic institution; and

WHEREAS, the Contractor has provided data analytics and machine learning expertise to the City through other grant work and as a partner in the Data Science Federation; and

WHEREAS, the parties hereto wish to enter into an Agreement pursuant to which the Contractor will perform the work and furnish the services as described herein for consideration and upon the terms and conditions as hereinafter provided; and

WHEREAS, the Contractor possesses the data science technical skill, knowledge, and expertise to apply machine learning to the City’s large datasets, inclusive of socio-economic data, and the various NASA datasets, and develop algorithms that provide predictive analytics and historical assessments of past interventions; and

WHEREAS, Contractor has represented that it is willing and able to provide the needed goods and services under the Agreement and City wishes to retain Contractor to provide those goods and services; and

WHEREAS, the services required are of an expert and technical nature and are temporary and occasional in character; therefore, competitive bidding under Charter Section 371 is neither practicable nor advantageous, nor compatible with the City's interests; and

NOW THEREFORE, in consideration of the above promises and of the terms, covenants and considerations set forth herein, the parties do agree as follows:

1.0 PARTIES TO THE AGREEMENT AND REPRESENTATIVES

1.1 Parties to the Agreement

The parties to this Agreement are:

- a. City – The City of Los Angeles, a municipal corporation, acting by and through the Information Technology Agency, having its principal office at 200 N. Main Street, 14th Floor, Los Angeles, California 90012.
- b. Contractor – Cal State LA University Auxiliary Services, Inc., a non-profit corporation and Sponsored Program Administrator for California State University, Los Angeles, with a business address at 5151 State University Drive, GE 314, Los Angeles, CA 90032.

1.2 Representatives to the Agreement

The representatives of the parties who are authorized to administer this Agreement to whom formal notices, demands, and communications will be given are as follows:

- a. The City's representative is, unless otherwise stated in the Agreement:

Matthew Hale, Deputy Mayor
City of Los Angeles
Mayor's Office of Finance & Innovation
200 North Spring Street
Los Angeles, CA 90012

With copies to:

Dawn Comer, Executive Officer
City of Los Angeles
Mayor's Office of Finance & Innovation
200 North Spring Street
Los Angeles, CA 90012

and

Bureau of Street Lighting Contract Administration
1149 S Broadway #200
Los Angeles, CA 90015
Attention: Megan Hackney

- b. The Contractor's representative is, unless otherwise stated in the Agreement:

Raul Castaneda, Interim Executive Director
 Cal State LA University Auxiliary Services, Inc.
 5151 State University Drive, GE 314
 Los Angeles, CA 90032

1.3 Formal Notices

Formal notices, demands, and communications to be given hereunder by either party must be made in writing and may be affected by personal delivery or by registered or certified mail, postage prepaid, return receipt requested and will be deemed communicated as of the date of mailing.

1.4 Notices of Change

If the name of the person designated to receive the notices, demands or communications or the address of such person is changed, written notice will be given in accordance with this Section, within five (5) business days of said change.

1.5 Conditions Precedent

- a. **Insurance Requirements.** The Contractor shall comply at all times with all of the insurance requirements set forth in the City of Los Angeles, Standard Provision for City Contracts,
- b. **Changes to Documentation.** Changes to the foregoing documents affecting the performance of the Contractor under this Agreement shall receive City approval in writing before the Contractor may affect the change.
- c. **Contract Assignment.** This contract is not to be assigned to a substitute contractor, a successor in interest, or a purchaser of the contract without express permission of the City. If the City does not approve or grant permission to be a subsequent contractor to assume the services outlined in this contract, then the contract will be terminated.

2.0 TERM OF AGREEMENT

The term of Agreement shall be from May 1, 2023 through August 31, 2025. Said term is subject to the termination provision contained in this Agreement.

3.0 SERVICES TO BE PROVIDED

- 3.1 As referenced in Exhibit 1, "Scope of Work", which is attached hereto and incorporated by reference, the Contractor will work with City and non-City Air Quality stakeholders noted in Section 1.6 of the PEACE FOR EEJ proposal to collect, cleanse and analyze the data collected.

- 3.2 The Contractor will develop machine learning algorithms for identifying and monitoring air quality trends and predicting air quality patterns, in correlation with socio-economic indicators, using satellite and ground level data and other related datasets.
- 3.3 The Contractor will leverage the cloud computational environment selected from the previous NASA Air Quality grant work.
- 3.4 The Contractor will work with the City to showcase the project at scheduled air quality convenings (local and global) from 2023 - 2025.
- 3.5 The Contractor will make algorithms and cleansed datasets accessible via GitHub and/or other agreed upon open-source tools
- 3.6 The Contractor will produce quarterly technical, mid-year interim and annual reports during the duration of the project.
- 3.7 The Contractor will provide expenditure reports and invoicing during the duration of the project.
- 3.8 The Contractor will synthesize research, outcomes, and key findings into annual reports during each project year.
- 3.9 The Contractor shall provide the data analysis and services based on the schedule noted below:

Task #	Tasks	Start	Duration
Task 3.1	Identify models and maintain data architecture	Third quarter 2023	Through third quarter 2024
Task 3.2	Enrich the data library with socio-economic data sets	Fourth quarter 2023	Through fourth quarter 2024
Task 3.3	Data preprocessing	Second quarter 2023	Through second quarter 2024
Task 3.4	Enrich ML algorithm	Third quarter 2023	Through fourth quarter 2024
Task 3.5	Conduct training runs	Third quarter 2023	Through fourth quarter 2024
Task 3.6	Create mobile/web apps	Second quarter 2024	Through first quarter 2025
Task 3.7	Leverage predictive algorithm to identify correlation between air quality and socio-economic indicators	Second quarter 2024	Through first quarter 2025
Task 3.8	Final ML model refinement	Second quarter 2024	Through second quarter 2025

4.0 COMPENSATION AND METHOD OF PAYMENT

4.1 Compensation

The City shall pay the Contractor for the satisfactory performance of the terms and conditions of this Agreement a total amount not to exceed \$123,756, payable per 2 CFR Section 200.201. according to completion of the milestones in the table below. This grant allows for 8% Facilities and Administrative Costs. This is inclusive of any required lab space.

Timeframe	Estimated Amount	Task
May 2023 - May 2024	\$69,378	Develop the web-based Visualization Platform for Air Quality and Socioeconomic data
June 2024 - Aug 2025	\$54,378	Develop air quality predictive models on the cloud backend. Connect the predictive models to the visualization platform.
Total	\$123,756	

4.2 Method of Payment

Invoices

The City shall pay the Contractor in accordance with Section 4.1 above and the conditions and provisions of this Section after receipt and approval of the Contractor's invoices by the City. To ensure that services provided under personal services contracts are measured against services as detailed in the contract, the Controller of the City of Los Angeles has developed a policy requiring that specific supporting documentation be submitted with invoices.

Billing & Invoicing Requirements

The Contractor is required to submit invoices that conform to City standards and include, at a minimum, the following information:

1. Name and address of Contractor
2. Name and address of City department being billed
3. Date of invoice and period covered
4. Contract number
5. Description of completed task and amount due per milestone payments:
 - a. Name of personnel involved in tasks
 - b. Description of completed task(s) associated with the project milestone payments
6. Certification by Contractor
7. Discount and terms (if applicable)
8. Remittance Address (if different from company address)

All invoices shall be submitted on Contractor's letterhead, contain Contractor's official logo, or other unique and identifying information such as the name and address of the contractor. Evidence that tasks have been completed, in the form of a report, brochure, or photograph, shall be attached to all invoices. Invoices shall be submitted within per quarterly, bi-annual and annual review schedule aligned to the NASA reporting milestones, and shall be payable to the Contractor no later than 30 days after City approval of a complete invoice. Invoices are considered complete when appropriate documentation or services are signed off as satisfactory by the City's Contract Manager.

Invoices and supporting documentation shall be prepared at the sole expense and responsibility of the Contractor. The City will not compensate the Contractor for costs incurred in invoice preparation, and grant funds made available pursuant to this Agreement shall not be used for the preparation of invoices and supporting documents.

The City may request, in writing, changes to the content and format of the invoice and supporting documentation at any time. The City reserves the right to request additional supporting documentation to substantiate at any time. Failure to adhere to these policies may result in nonpayment or non-approval of demands, pursuant to Charter 262(a), which requires the Controller to inspect the quality, quantity, and condition of services, labor, materials, supplies, or equipment received by any City office or department, and approve demands before they are drawn on the Treasury.

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Any change in the terms of this Agreement must be incorporated into this Agreement by a written amendment properly executed and signed by the person authorized to bind the parties thereto.

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
IN WITNESS THEREOF, the parties hereto have caused this Agreement to be executed by their respective duly authorized representatives.

CITY OF LOS ANGELES, by and through its
Department of Public Works
Bureau of Street Lighting

Cal State LA University
Auxiliary Services, Inc. a non-profit
corporation*

By signing below, the signatory attests
that they have no personal, financial,
beneficial, or familial interest in this contract.

By: _____
AURA GARCIA
President
Board of Public Works

By:  _____ 
RAUL CASTANEDA
Interim Executive Director
Cal State LA University Auxiliary
Services, Inc.

Date: _____

Date: 06/10/2024

\ 
By: _____
MIGUEL SANGALANG
Executive Director
Public Works Street Lighting

By: _____
[INSERT NAME]
[Insert Title]

Date: 06/27/2024

Date: _____

APPROVED AS TO FORM:

HYDEE FELDSTEIN SOTO
City Attorney

ATTEST:

HOLLY L. WOLCOTT
City Clerk

By: _____
TANEA YSAGUIRRE
Deputy City Attorney

By: _____
Deputy City Clerk

Date: _____

Date: _____

* Approved signature methods for corporations:

- 1) Two signatures: One of the Chairman of the Board of Directors, President, or Vice-President, and one of the Secretary, Assistant Secretary, Chief Financial Officer, or Assistant Treasurer, or
- 2) One signature of a Corporate-designated individual together with a properly attested resolution of the Board of Directors authorizing the individual to sign.

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Scope of Work: Predictive Environmental Analytics and Community Engagement for Equity and Environmental Justice (PEACE for EEJ)

City of Los Angeles Bureau of Street Lighting,
California State University

Background

Air pollution is mostly a human-made problem and is known as a silent killer. Every 5 seconds, someone dies from the effects of air pollution, which is responsible for the early deaths of 7 million people every year and 107.2 million disability-adjusted-life-years globally. With the percentage of the global population living in urban areas projected to increase from 54% in 2015 to 68% in 2050 and in the U.S. up to 89%, the prevention of a significant increase in air pollution-related loss of life requires comprehensive mitigation strategies, as well as forecast systems, to limit and reduce the exposure to harmful urban air. The pandemic has added to this challenge with long-term effects of COVID on millions more who are struggling to breathe and are facing respiratory complications for the rest of their lives. More than 182 million people have contracted COVID and nearly 4,000,000 have died. The ability to predict air quality, intervene to mitigate poor air quality activities, and to inform those suffering from respiratory issues is a growing concern for government and health officials worldwide.

According to the American Lung Association and NIH National Institute of Environmental Health Science [1]-[2], poor families and people of color often face higher exposure to air pollutants and experience greater health impacts. Our recent study on the people of California demonstrates that minority and low-income communities tend to be exposed to higher levels of air pollution and hit hardest by the adverse health consequences of air pollution [3]. Our results show that the neighborhoods with a high percentage of residents living in poverty tend to have the highest asthma rates [3]. Figure 1 demonstrates the results by comparing the Asthma rate by neighborhood with Poverty percentage by neighborhood in Greater Los Angeles [3].

Some megacities like Los Angeles operate a network of ground-based monitoring stations for ozone and particulate matter (PM) 2.5. However, the integration of socioeconomic data with ground-based data, satellite data and other Earth observations along with advanced data analytics and machine learning methods can significantly improve our understanding of air pollution, enable us to predict air pollution and its health effects. This will also enhance our capabilities to manage air pollution and most importantly to support the most vulnerable people, including minority and low-income communities that tend to be exposed to higher levels of air pollution and its health consequences.

The solution to some of this is the creation of **Predictive Environmental Analytics and Community Engagement system for Equity and Environmental Justice (PEACE for EEJ)**. The objective of

PEACE for EEJ is to increase the accessibility and use of Earth observations and Socioeconomic data for understanding air quality and to integrate it into governmental and health organizations' decision making processes that enhance pollution mitigation strategies and support Equity and Environmental Justice initiatives. We propose the development of advanced data analytics algorithms, machine learning (ML)-based models, and user interfaces (UIs) that link Socioeconomic data with ground-based in-situ and space-based Earth observations to (a) identify, discover, and classify patterns in urban air quality, (b) enable the forecast of air pollution events for air quality management, air pollution deduction, and decision making, (c) understand the impact of air pollution on people's health and predict individuals' health risks related to air pollution for decision making, (d) identify and support the neighborhoods and communities that face higher exposure to air pollutants and experience greater health impacts, and (e) provide information about air pollution predictions and future health effects/risks through a mobile application and a web dashboard. In short, providing decision makers and EEJ focused organizations with air quality data to support further partnership on decision making on policies that support interventions.

The *PEACE for EEJ* project will provide novel and critical air quality and health data for the City of Los Angeles and its 4 million residents by bringing the data to the public in a way that works across communities and cultural differences and specifically analyzes, engages, and responds to needs for environmental justice. While there are currently existing air quality apps that provide and aggregate air pollution values, *PEACE for EEJ* will provide prediction data through mobile and web-based applications that predict what air quality and associated health impacts will be 5-10 days into the future. Along with the week's forecast, a color-coded rating system will demonstrate whether the air pollution concentration level for today and for several days ahead is safe to breathe based on predictive health impacts (e.g., triggering asthma attacks in vulnerable people).

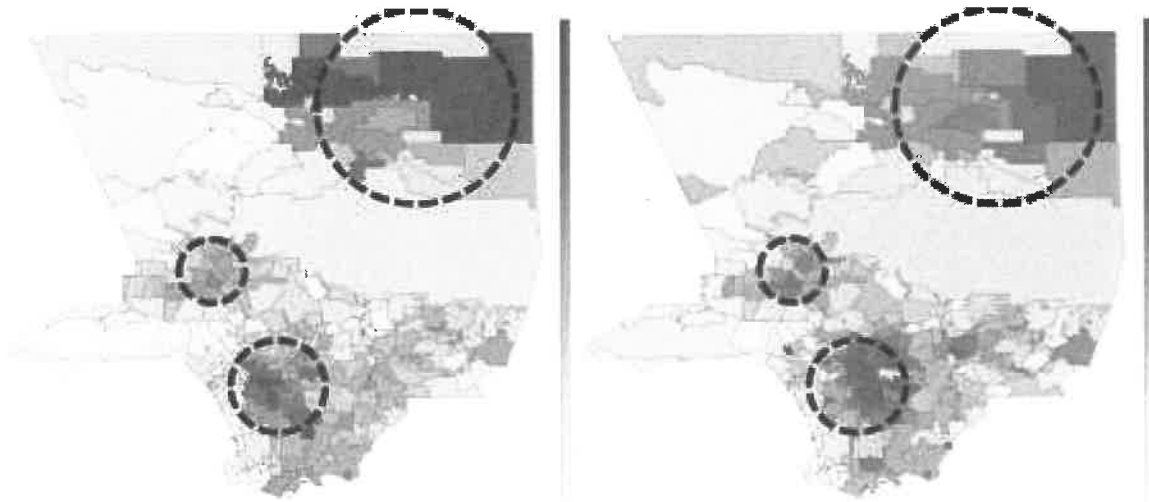


Figure1. Left: Asthma Rate By Neighborhood. Right: Poverty Percentage By Neighborhood.

Project Plan

The objective of this project is to increase the accessibility and use of space data by using machine learning to help cities predict air quality in ways that can be acted upon to improve human health outcomes and provide better data to individuals and cities. Secondly, the goal is to provide these tools

and algorithms to future Earth science missions (e.g., MAIA) to provide rapid ground truth, combine multiple data sources, and support more rapid use of mission data.

This project will focus on maturing the technologies involved in:

- Developing machine learning algorithms for predictive models for air quality based on PM2.5 and other air pollutants
- Build a big data analytics algorithm for integrating ground and space data
- Provide predictive models for health risk using deep learning and machine learning
- Build an open source PM2.5 stack for integrating ground and space data
- Create a model for cities with shared attributes to understand predictions and effective interventions

This work contributes to the state of knowledge in several specific ways.

- The application of machine learning models will allow the processing of big data with complexity of velocity, veracity, and volume in a human understandable way and at actionable speed
- The set of infusion partners gathered will provide actions that will demonstrably improve human health and outcomes, as well as commercialization of the technology
- Combining in-situ ground data and satellite data with machine learning allows us to create wide areas of ground truth and fidelity. This has implications for providing ground to orbital measurements and validation of flight hardware against ground truth.

Projects Tasks and Timeline

Task	Year1					Year2					Task Owner
Convene EJ partners and communities		X			X			X		X	City
Data identification and refresh	X	X	X	X							OpenAQ, CSULA, City
Identify models and select data architecture		X	X	X	X	X	X				CSULA
Migrate data to platform				X	X		X	X	X		CSULA
Data preprocessing	X	X	X	X	X	X					CSULA
Develop ML algorithm			X	X	X	X	X	X	X		CSULA
Identify interventions, socio-economic conditions and EJ policies and priorities for the City			X	X		X				X	City
Prepare mobile app wireframes				X				X	X		City
Conduct training runs			X	X	X	X	X	X			CSULA
Conduct pre- and post-interventions					X			X	X	X	City
Create mobile/web apps						X	X	X	X	X	CSULA/City
Validate algorithm and evaluate for bias						X	X	X	X	X	City/CSULA
Final ML model refinement							X	X	X	X	CSULA
Publish/update open source										X	OpenAQ
Conduct OpenAQ EEJ community workshop				X							OpenAQ
Culmination workshop										X	City of LA, OpenAQ


PEACE for EEJ - Partner CSULA - MOU - FINAL 5.29.24.v2 (Dr. Mohammad Pourhomayoun)


Final Audit Report


2024-06-10


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