

ELPC Air Quality Monitoring Report

Auburn Gresham • 2018–19



**ENVIRONMENTAL LAW
& POLICY CENTER**



Introduction

Air pollution is a serious threat to the residents of Chicago, but pollution levels can vary by neighborhood and even block-to-block. To understand airborne particulate matter pollution at the local level, the Environmental Law & Policy Center (ELPC) and community partners are conducting an air quality monitoring program to gather baseline knowledge of neighborhood particulate matter concentrations.

This report highlights the data collected in the Greater Auburn Gresham community on the city's far southwest side in 2018 and 2019. Based on this data, we have also provided policy recommendations from ELPC and our community partners, to improve air quality and protect Chicagoans from dangerous air pollution.

1. What is Particulate Matter and Where Does it Come From?

Particulate matter (PM) is a highly toxic air contaminant composed of a mixture of fine carbon soot particles and gases that cause negative impacts on human health and the environment.

Heavy duty equipment that burns diesel fuel is a major source of PM pollution in Chicago, such as trucks, buses, and heavy construction machinery. Diesel combustion pollutes the air with harmful particulates in and around the highways, rail yards, ports, intermodal facilities, and construction sites where they operate. Other sources of PM include cars, wood burning stoves, industry, agricultural burns, and forest fires.

As a transportation and economic hub for the nation, Chicago has a high concentration of diesel vehicles and heavy equipment activity in many communities. Residents who live and work near areas with high concentrations of particulate pollution are at risk of adverse health effects.

2. Particulate Matter and Health

Fine particulate matter (PM_{2.5}) can affect multiple systems in the human body. These microscopic particles are able to penetrate the natural defenses of the human body and can become lodged in the lungs and enter the bloodstream. Long-term PM_{2.5} exposure exacerbates asthma, chronic obstructive pulmonary disease (COPD), and other serious respiratory illnesses. It also has negative impacts on neurological systems, including impaired cognitive function, neurodevelopmental issues, and the potential for lifelong mental health problems.

The people most vulnerable to PM_{2.5} include children, elderly, and those with respiratory illnesses. Children are at particularly high risk due to their underdeveloped lung function and capacity. Elderly folks are at high risk for aggravation of chronic respiratory and cardiovascular illnesses.

Asthma is the most common chronic condition among children, affecting one in ten nationwide. African American and Latinx children are more likely to be hospitalized or die from asthma related causes than Caucasian children. Chicago children's asthma rates are very high, with some neighborhoods seeing one in every three children affected. The problem is even more acute in Chicago, where Asthma hospitalization rates are twice the national rate. COPD and other respiratory illnesses and heart problems are also rampant.

PM2.5 and its associated toxins are also detrimental to the environment, as they contribute to local smog formation and contain greenhouse gases that significantly accelerate climate change. The United States Environmental Protection Agency (USEPA) groups and classifies PM2.5 concentration levels by air quality ranges and levels of health concern, as shown in *Figure 1*.

3. ELPC Examines PM2.5 in Chicago's Neighborhoods

In our air quality campaign, ELPC measures short-term PM2.5 using the AirBeam, a low-cost, open-source, hand-held monitor manufactured by HabitatMap, a Brooklyn-based environmental

health justice non-profit. Despite its low cost, the AirBeam's measurements correlate well with the USEPA federal regulatory monitors (FRM). The AirBeam samples air at 1 second intervals and uses LED light-scattering technology to measure PM2.5 concentrations.

Short-term PM2.5 exposure poses a wide variety of health risks, including coughs, headaches, lightheadedness, nausea, aggravated allergies, increased risk of heart attack and other cardiovascular trauma.

PM2.5	Air Quality Index	PM2.5 Health Effects	Precautionary Actions
0 to 12.0 ug/m3	Good 0-50	Little to no risk.	None.
12.1 to 35 ug/m3	Moderate 51 to 100	Unusually sensitive individuals may experience respiratory symptoms.	Unusually sensitive people should consider reducing prolonged or heavy exertion.
35.1 to 55 ug/m3	Unhealthy for Sensitive Groups 51 to 100	Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and elderly.	People with respiratory or heart disease, the elderly and children should limit prolonged exertion.
35.1 to 55 ug/m3	Unhealthy for Sensitive Groups 51 to 100	Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in general population.	People with respiratory or heart disease, the elderly and children should limit prolonged exertion; everyone else should limit prolonged exertion.

Figure 1. U.S. EPA particulate matter concentration level classifications.

Monitoring in Auburn Gresham

ELPC works with two community partners in Auburn Gresham. MAPSCorps is a southside-based organization that trains youth to produce high quality data about community assets and the Greater Auburn Gresham Development Corporation (GAGDC) is a community development corporation that works to promote programs and initiatives that improve overall community vitality, to collect particulate matter data in the summer.

Each year fifteen teens participated in the monitoring program. Those teens were divided into three groups; each group was given an Airbeam monitor to collect data while asset mapping and answering research questions about their communities. Groups walked down sidewalks on busy streets in Auburn Gresham, including Damen, Ashland, Racine, Halsted Vincennes, Stewart, 79th, and 87th, as shown in *Figure 2*. The data was collected on various dates from May to August in 2018 and 2019, typically between 8:00am to 2:00pm, Monday through Thursday.

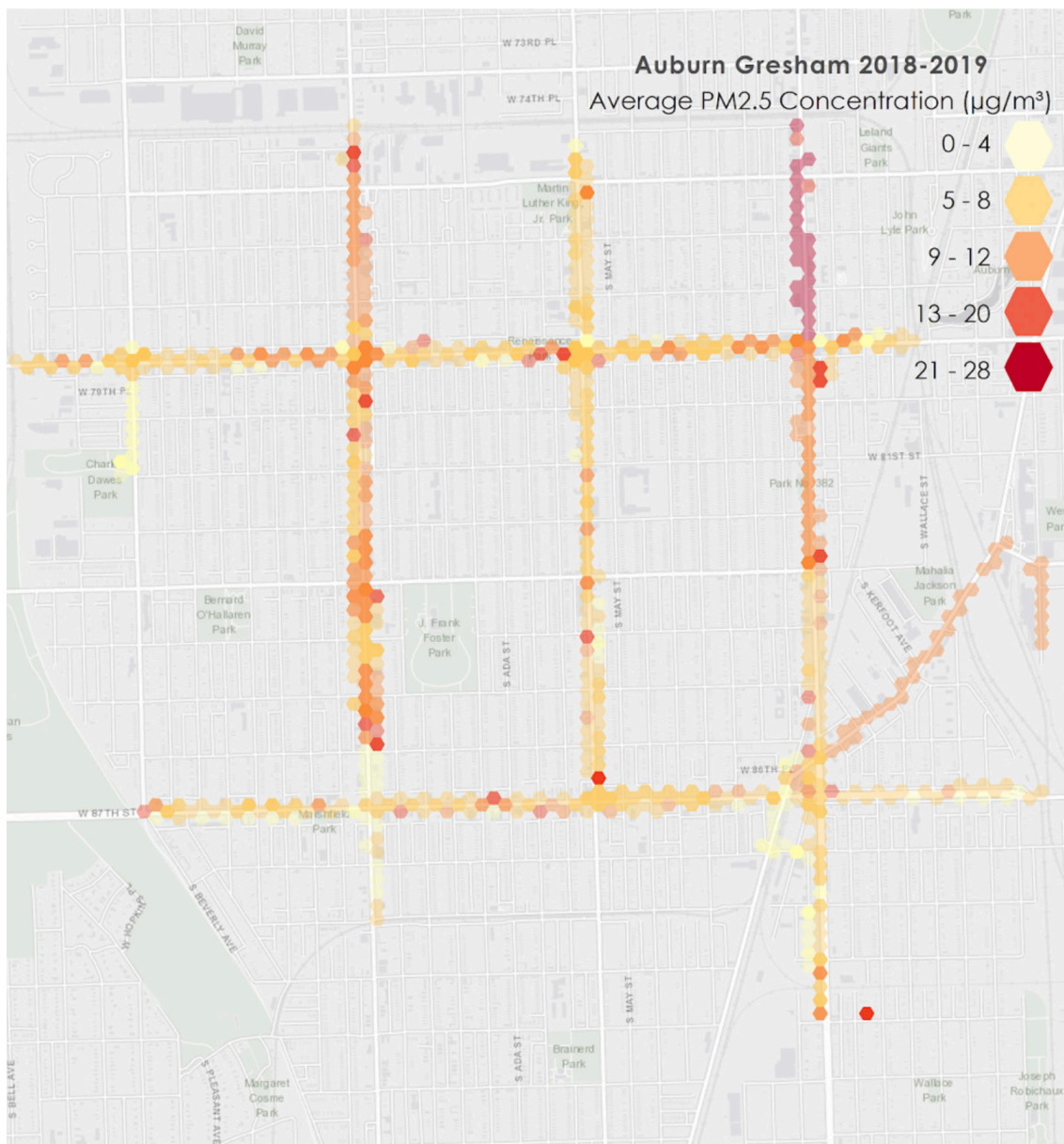


Figure 2. Average PM2.5 Concentration ($\mu\text{g}/\text{m}^3$) in Auburn Gresham 2018-2019

Topline Results

As of Spring 2020, 86,937 PM_{2.5} data points have been collected by MAPSCorps, GAGDC, and other ELPC partners along major corridors in Auburn Gresham. Of that data, 84% fell into the “good” air quality range (0-12 $\mu\text{g}/\text{m}^3$), 15% was “moderate” (12-35 $\mu\text{g}/\text{m}^3$), and 1% was in the “unhealthy” categories (above 35 $\mu\text{g}/\text{m}^3$).

The box plots and line graphs below (Figures 3-6) illustrate the PM levels that MAPSCorps and GAGDC youth documented while monitoring. Box plots are used to show the range of PM encountered during an hour. Outliers (the dots) depict moments when PM levels exceeded the normal range for that hour. The line graphs illustrate the average PM levels experienced by the hour.

Auburn Gresham Air Quality Data

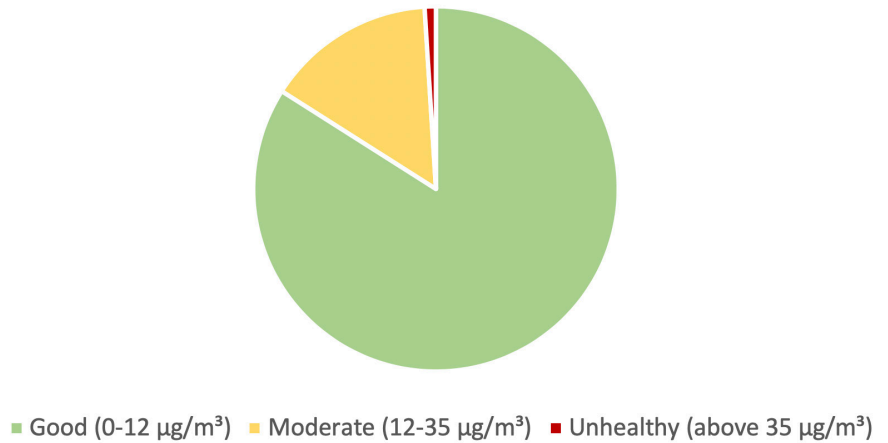


Figure 3. Average PM 2.5 categories in Auburn Gresham in 2018 & 2019

2019 Hourly Breakdown

54,109 data points were collected in 2019 during May, July, and August typically from 8:00am to 1:00pm (13:00). The box plot illustrates the range of PM_{2.5} concentrations the monitor volunteers encountered while collecting data and when they experienced PM_{2.5} levels that exceeded the “unhealthy” categories (above 35 $\mu\text{g}/\text{m}^3$). Unhealthy levels of PM_{2.5} were recorded at both 9:00am and 11:00am at the southwest corner of 79th & Racine Ave near the 79th street bus stop.

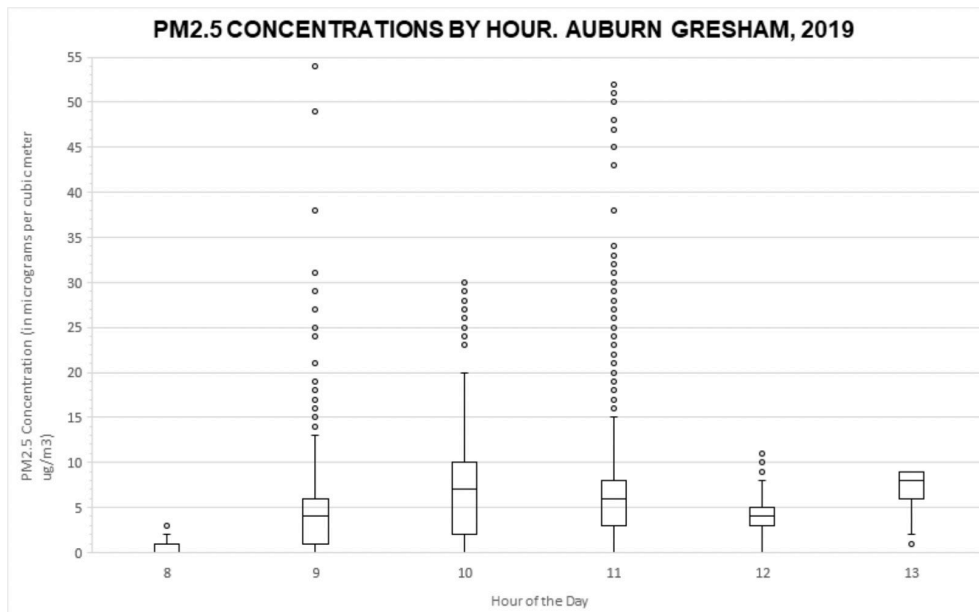


Figure 3. Summary box plots of PM_{2.5} concentrations ($\mu\text{g}/\text{m}^3$) by hour of the day.

Overall hourly exposures throughout the day are low and well within the healthy PM2.5 range, with the highest hourly average occurring at 1:00pm (13:00).

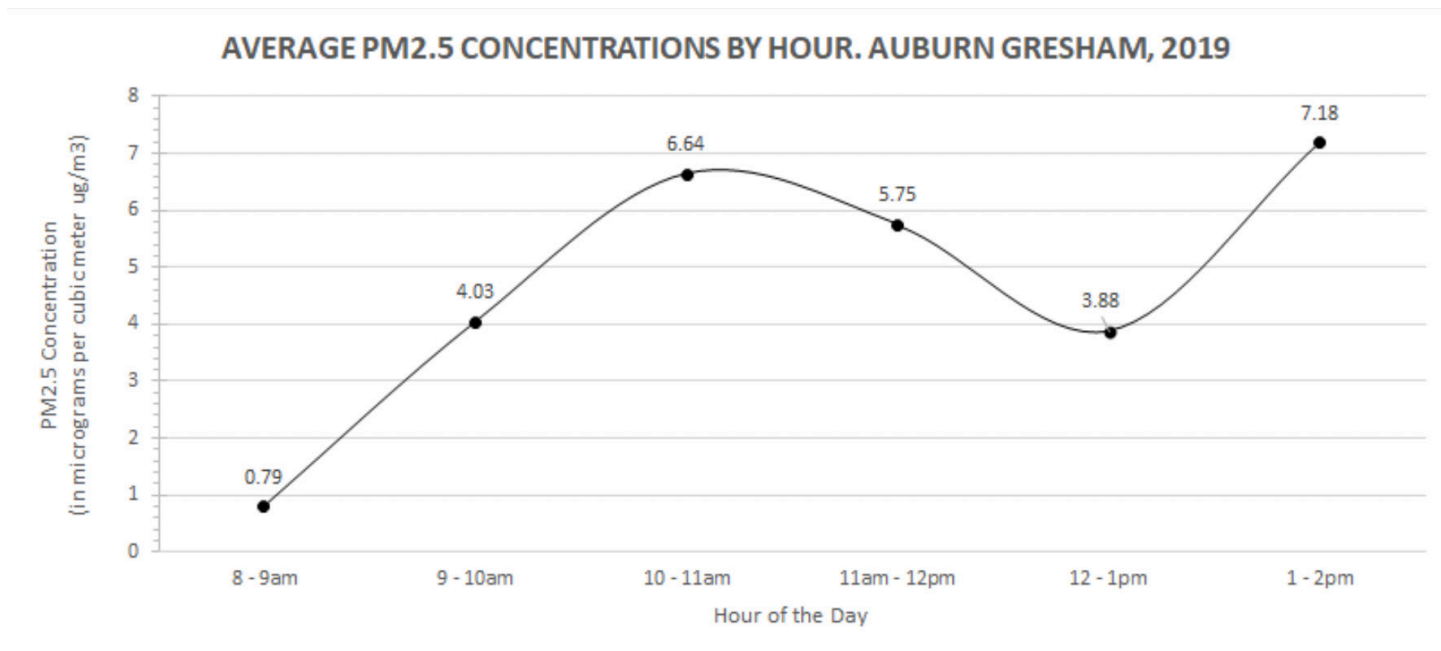


Figure 4. Average PM2.5 concentrations in Auburn Gresham, 2019 by hour of the day.

2018 Hourly Breakdown

32,828 data points were collected in 2018 during June and July most often from 9:00am to 2:00pm (14:00). The box plot illustrates the range of PM2.5 concentrations the monitor volunteers encountered while collecting data and when they experienced PM2.5 levels that exceeded the “Unhealthy” categories (above 35 $\mu\text{g}/\text{m}^3$). Unhealthy levels of PM2.5 were recorded at 9:00am at the Halsted & 79th Street CTA terminal, and 10:00am at 79th Street & Throop.

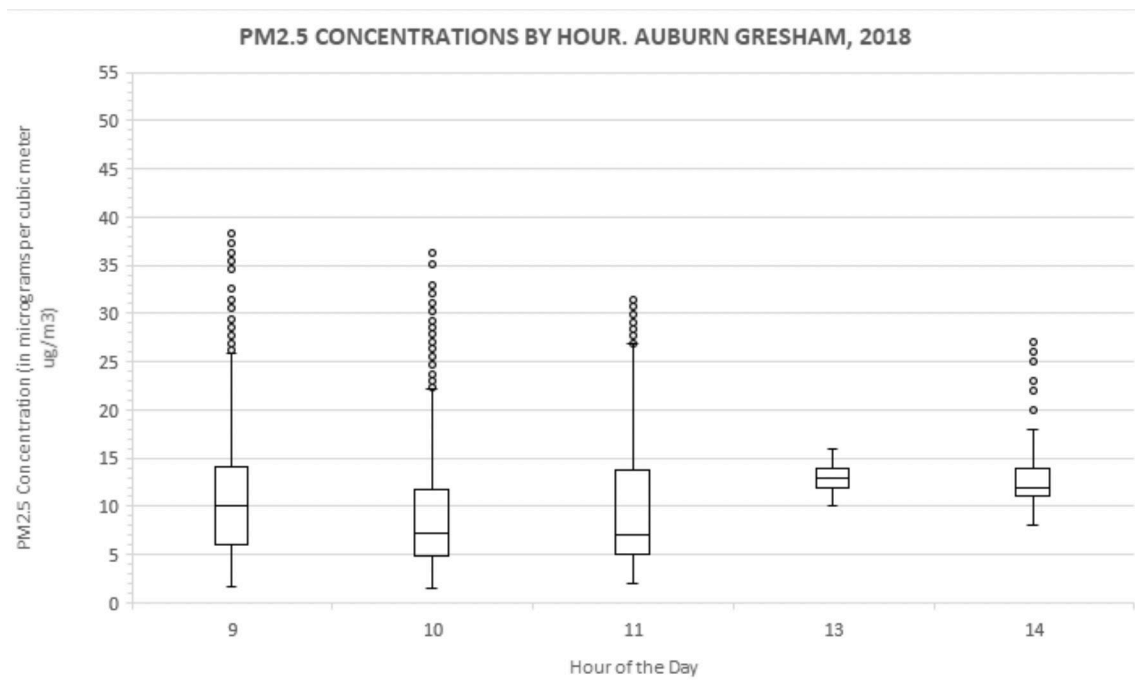


Figure 4. Average PM2.5 concentrations in Auburn Gresham, 2019 by hour of the day.

Hourly exposures throughout the day are low and mostly within the healthy PM2.5 range rising in the afternoon to the moderate category with the highest hourly averages of 13.04 $\mu\text{g}/\text{m}^3$ occurring between 1:00pm (13:00) and 2:00pm and 12.45 $\mu\text{g}/\text{m}^3$ at 2:00pm (14:00).

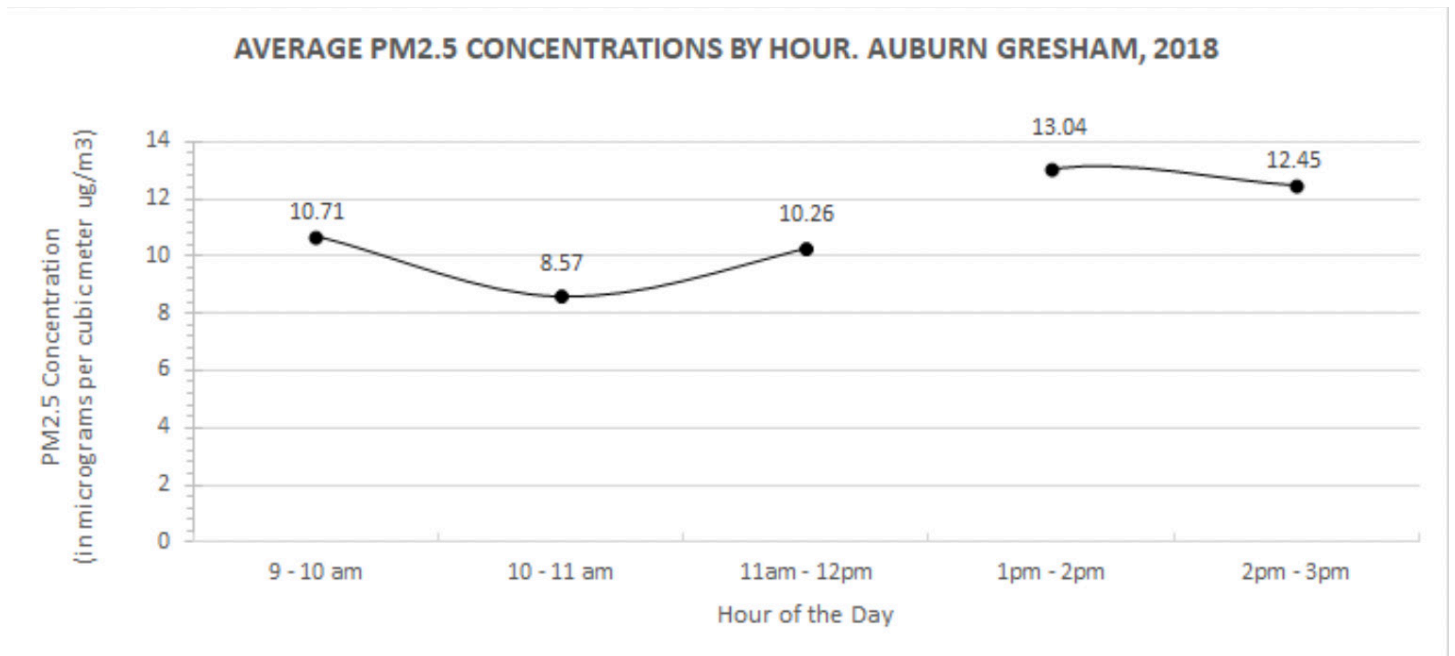


Figure 6. Average PM2.5 concentrations in Auburn Gresham, 2018 by hour of the day.

Data Summary

Hourly concentrations overall were lower in 2019 than 2018. Both years showed peaks between 9 to 10 am (rush hour) at intersections and bus stops - suggesting traffic is a major driver of momentary harmful PM peaks.

Recommendations to Improve Air Quality

ELPC will continue monitoring with GAGDC expanding coverage to 76th Street and 95th Street. Due to the high levels of PM recorded around bus stops, ELPC suggests that data collectors take note of air quality when next to a bus. Should we mention how we're adjusting to the new circumstances in 2020? Is anybody going to be monitoring down there?

Monitoring air quality is just the first step to help target opportunities for effective air improvement. Based on this preliminary data, ELPC and our community partners have put together the following recommendations to protect the residents of Auburn Gresham and the wider community from air pollution.

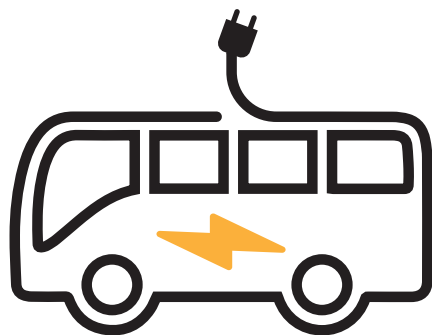
1. Vegetative/Sound Buffer



Living, working, or going to school near highways and major transportation corridors can be harmful to respiratory, endocrine, and cardiovascular health. Children in schools in these areas are especially at risk due to underdeveloped lungs and prolonged exertion outdoors. Studies show a combination of thick, tall, full coverage, coniferous vegetation, such as evergreens, and sound barriers can significantly lower pollution around schools near highways.

ELPC seeks to work with GAGDC and community partners to collect data and advocate for effective vegetative/sound barriers around schools within 500 feet of I 90/94. Which schools? This advocacy could include contacting and working with local, state, and federal officials. And partnering with Openlands? If folks are doing less monitoring amid the pandemic, might this be a tactic we lean into more this year with this partner?

2. CTA Electrification



The 79th street bus carries the most riders every year, making it Chicago's busiest bus line. The CTA is working to improve service on this line to reduce congestion around bottleneck areas which could improve traffic flow and lessen idling, thus reducing PM.

ELPC seeks to work with GAGDC and interested community partners to ensure that the Chicago Transit Authority (CTA) carries out the Mayor and city council's goal of complete electrification of its 1800 bus fleet by 2040; further, making the 79th street route a priority for early electrification.



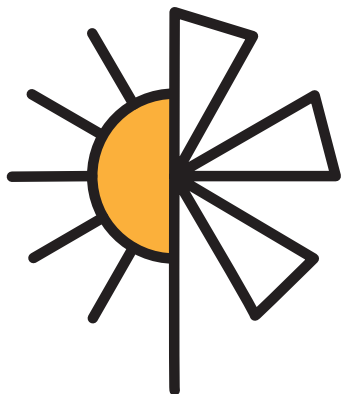
3. Clean Construction



Construction relies on the use of heavy-duty diesel vehicles that emit toxic compounds and particulate matter, so it also poses a threat to respiratory health. Changing construction practices can reduce street level particulate matter levels benefiting both the workers and community. Clean construction utilizes cleaner equipment and limits idling to lower pollution at and near work sites. Chicago has a clean construction ordinance that applies to a subset of city projects, but neighborhoods could benefit by advocating for clean construction practices at both the city and private developments.

ELPC will work with the Greater Auburn Gresham Development Corporation to advocate for clean construction. Near term opportunities include the Green Era Digester, The Auburn Gresham Healthy Hub, and various potential Invest South West projects.

4. Federal Advocacy



Air pollution is an invisible killer. Three of the nation's leading causes^{5.27.20} of death (heart disease, cancer, and respiratory illnesses) are exacerbated by air pollution. In a recent study, researchers documented a 5% increase in PM_{2.5} between 2016 to 2018, after years of decline. They found the increase associated with damages of \$89 billion and 9,700 additional premature deaths. The world is facing great challenges right now in the midst of a respiratory pandemic, and early studies show a correlation between communities with high rates of particulate matter pollution and coronavirus deaths, making it all the more important to understand and tackle the sources of air pollution that plague our city. While it may seem expensive to alter construction or transportation equipment, it costs us far more to do nothing. ELPC remains committed to protecting clean air and healthy communities in Chicago and across the Midwest.



ENVIRONMENTAL LAW & POLICY CENTER

The Environmental Law & Policy Center is the Midwest's leading public interest environmental legal advocacy and eco-business innovation organization. We develop and lead successful strategic advocacy campaigns to improve environmental quality and protect our natural resources. We are public interest environmental entrepreneurs who engage in creative business deal making with diverse interests to put into practice our belief that environmental progress and economic development can be achieved together. ELPC's multidisciplinary staff of talented and experienced public interest attorneys, environmental business specialists, public policy advocates and communications specialists brings a strong and effective combination of skills to solve environmental problems.

ELPC's vision embraces both smart, persuasive advocacy and sustainable development principles to win the most important environmental cases and create positive solutions to protect the environment. ELPC's teamwork approach uses legal, economic, scientific and public policy analysis, and communications advocacy tools to produce successes. ELPC's strategic advocacy and business deal-making involves proposing solutions when we oppose threats to the Midwest environment. We say "yes" to better solutions; we don't just say "no."

ELPC was founded in 1993 after a year-long strategic planning process sponsored by seven major foundations. We have achieved a strong track record of successes on both national and regional clean energy development and pollution reduction, transportation and land use reform, and natural resources protection issues. ELPC brings a new form of creative public advocacy effectively linking environmental progress and economic development that improves the quality of life in our Midwest communities.

Headquarters

35 East Wacker Drive, Suite 1600
Chicago, IL 60601
(312) 673-6500
ELPC.org, elpcinfo@elpc.org

Social

Facebook & Twitter: @ELPCenter

Regional Offices

Columbus, OH
Des Moines, IA
Grand Rapids, MI
Madison, WI
Minneapolis, MN
Washington, DC

