

City of Winston-Salem, Department of Sustainability

ENVIRONMENTAL JUSTICE ANALYSIS

2024





CITY OF WINSTON-SALEM:

Environmental Justice Analysis 2024

This analysis explores the environmental justice issues within Winston-Salem, highlighting the affected communities, the contributing factors, and the environmental impacts observed.

Authored by the Sustainability Department. The report aims to provide insights and recommendations to foster a more equitable environmental situation in Winston-Salem.

City of Winston Salem
Environmental Justice Analysis
2024

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Introduction

The impacts of climate change are likely to be felt unevenly due to inequalities of race, ethnicity, gender, and socioeconomic status. Those with fewer resources are less able to adapt and cope with abrupt changes, and in many cases, they face increased risks due to structural inequities that have created unequal environmental effects.

On Oct. 24, 2023, Governor Cooper signed Executive Order 292, “Advancing Environmental Justice for North Carolina.” The Order is meant to help “gather information on cumulative impacts and develop recommendations on how to address them (Sorg, 2023).” This Executive Order follows 2022’s Order No. 246, which directed cabinet agencies to consider environmental justice when taking actions related to climate change, resilience, and clean energy.

This report is meant to identify possible inequities and identify areas that need to be accounted for in future decision-making for Winston-Salem.

Indigenous Acknowledgement

The lands that the City of Winston-Salem steward served for centuries as a place for exchange and interaction for Indigenous peoples, specifically Saura (saw-ra), Catawba (ka-tah-buh), Cherokee (chair-o-kee), and Lumbee (lum-bee). We recognize that North Carolina is currently home to the following Indigenous tribes: The Eastern Band Cherokee, Coharie, Haliwa-Saponi, Lumbee, Meherrin, Occaneechi Band of the Saponi, Sappony, Tuscarora and the Waccamaw-Siouan, in addition to many other individuals belonging to Indigenous nations outside of North Carolina. We celebrate and honor the original and present-day Indigenous people of this land, their stewardship, and their contributions.

History

Before colonists and enslaved peoples arrived, several indigenous peoples populated the area that Winston-Salem occupies. By the early eighteenth century, this population had been severely reduced due to epidemics, slavery, and war.



Settlement of these lands that were claimed by colonists was shaped by geography and race and class. Waterways, and later Wagon Roads¹, influenced the settlement of new immigrants. Towards the end of the 1800s, settlement patterns began to follow streetcars and paved streets, largely used for white suburbs. Throughout, economics often played a part in creating inequities, whereby economic differences meant that black neighborhoods were often in the least desirable living areas—lower, hotter, and more prone to flooding.

The City of Winston-Salem has a history of intentional residential segregation. On May 21, 1865, when the end of slavery was announced in St. Phillips African Moravian Church, newly free slaves were prohibited from buying land in the town of Salem. They were limited to the property across from Salem Creek—an area that is known as Liberia or Happy Hill.

¹ Many roads created and used by settlers followed the early trail pattern from the Indigenous peoples, and therefore, influence the pattern of development still seen today.

In June 1912, Winston-Salem's Board of Alderman enacted an ordinance that formalized city segregation laws. The North Carolina Supreme Court declared the segregation ordinance unauthorized; however, segregation would continue via ordinances in 1930 that divided the city into zones and specified where white and black residents could live.

The 1930s saw redlining policies that assessed the credit-worthiness of neighborhoods and designated black neighborhoods as "declining" or "hazardous" so that they could not access housing loans. In the 1950s, Winston-Salem was also affected by development of highway infrastructure, which razed many black neighborhoods or created divides between them.

The history of segregation has led to many of the inequities and injustices that Winston-Salem still faces today. Many black and brown neighborhoods, without as much historic access to resources and community power, have fewer positive environmental amenities such as trees, and are faced with more environmental risks including air pollution. Significant events, such as the Winston Weaver fertilizer plant fire, have highlighted the difficulties. Within one mile of the fertilizer factory, 51% of residents were black and 26% Hispanic, with a per capita income of \$17,423, well below the Forsyth County average².



Slater Industrial Academy and State Normal School, C. 1900

Source: Digital Forsyth

² Per capital income in Forsyth County in 2020 was over \$50,000

The Justice40 Initiative³, introduced by the Biden administration in 2021, aims to ensure that 40% of the overall benefits of federal investments in climate and clean energy initiatives are delivered to disadvantaged communities. This initiative acknowledges the disproportionate impact of climate change and environmental hazards on low-income and minority communities and seeks to address longstanding inequities. By allocating a significant portion of federal funding to these areas, Justice40 provides a framework for cities to focus on inclusive, community-driven solutions that foster sustainability and resilience. By prioritizing environmental justice, Justice40 provides a framework for cities to focus on inclusive, community-driven solutions that foster sustainability and resilience. For our city, implementing Justice40 principles means actively working to enhance the quality of life for all residents, particularly those who have been historically marginalized. This commitment not only aligns with broader federal goals but also fosters social equity, economic development, and a healthier environment, ensuring that the city's growth and prosperity are shared equitably.

Disadvantaged Census Tracts

- Disadvantaged
- Not Disadvantaged

³ Justice40 requires that 40% of the benefits of certain government programs be delivered to disadvantaged communities. Multiple tools/maps in this report were developed by the federal government to show these locations.

Overview of Winston-Salem

Demographics

Sociodemographic data—such as income levels, race/ethnicity, housing conditions—plays a crucial role in determining a community’s vulnerability to environmental hazards. Understanding the intersection of these factors is essential for advancing environmental justice, as these factors shape both the risk of exposure and the ability of communities to recover from environmental stressors. By presenting charts that map the geographic distribution of these vulnerable populations, we can visually highlight the areas most at risk and where targeted interventions are needed.

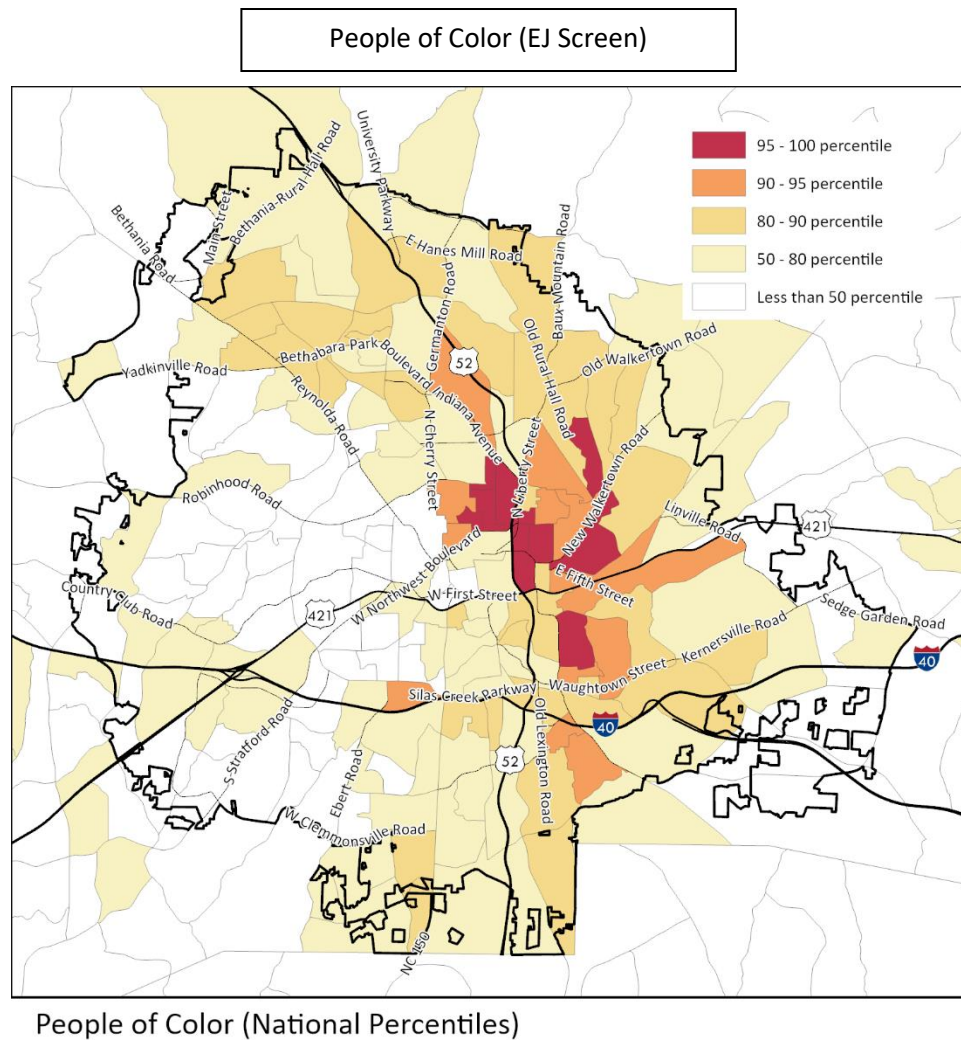
The Census estimates for Winston-Salem’s population for July 1, 2022, were 251,350. Of this population, 44.9% was White Alone, 33.2% Black or African American, and 16.6% Hispanic or Latino. 7.4% of the population identified as Two or More Races and 2.5% Asian. Owner-occupied housing accounted for 53.9% of units. 18.4% of the population was defined as in poverty.

Data published in 2022, notes the populations divided by ward.

Population Summary Report											
	TOTAL Population	Target Population	Target Deviation	Target Deviation (%)	Non-Hispanic White	Hispanic	Non-Hispanic Black	Non-Hispanic Asian	Non-Hispanic Hawaiian or Other Pacific Islander	Non-Hispanic Some Other Race	Non-Hispanic Two or More Races
East Ward	31,361	31,193	168	0.54	10,846	4,752	14,449	540	17	206	224
North Ward	31,002	31,193	-191	-0.61	8,305	6,799	14,416	500	129	288	320
Northeast Ward	31,370	31,193	177	0.57	6,296	6,602	17,437	243	32	178	320
Northwest Ward	31,177	31,193	-16	-0.05	21,506	2,268	5,153	1,453	29	297	153
South Ward	31,155	31,193	-38	-0.12	14,023	5,476	9,806	938	15	275	244
Southeast Ward	30,942	31,193	-251	-0.8	7,762	11,014	11,026	376	19	199	242
Southwest Ward	31,213	31,193	20	0.06	16,614	4,185	7,901	1,527	11	325	266
West Ward	31,325	31,193	132	0.42	24,362	1,745	2,647	1,822	13	300	121

The East, North, Northeast, and Southeast wards are predominately Non-Hispanic Black. The Southeast ward is also home to an approximately equal number of Hispanic residents.

This distribution can also be seen in the following map from EJ Screen, a mapping tool from the US Environmental Protection Agency (EPA)⁴.



⁴ Percent of individuals in a block group who list their racial status as other than white alone

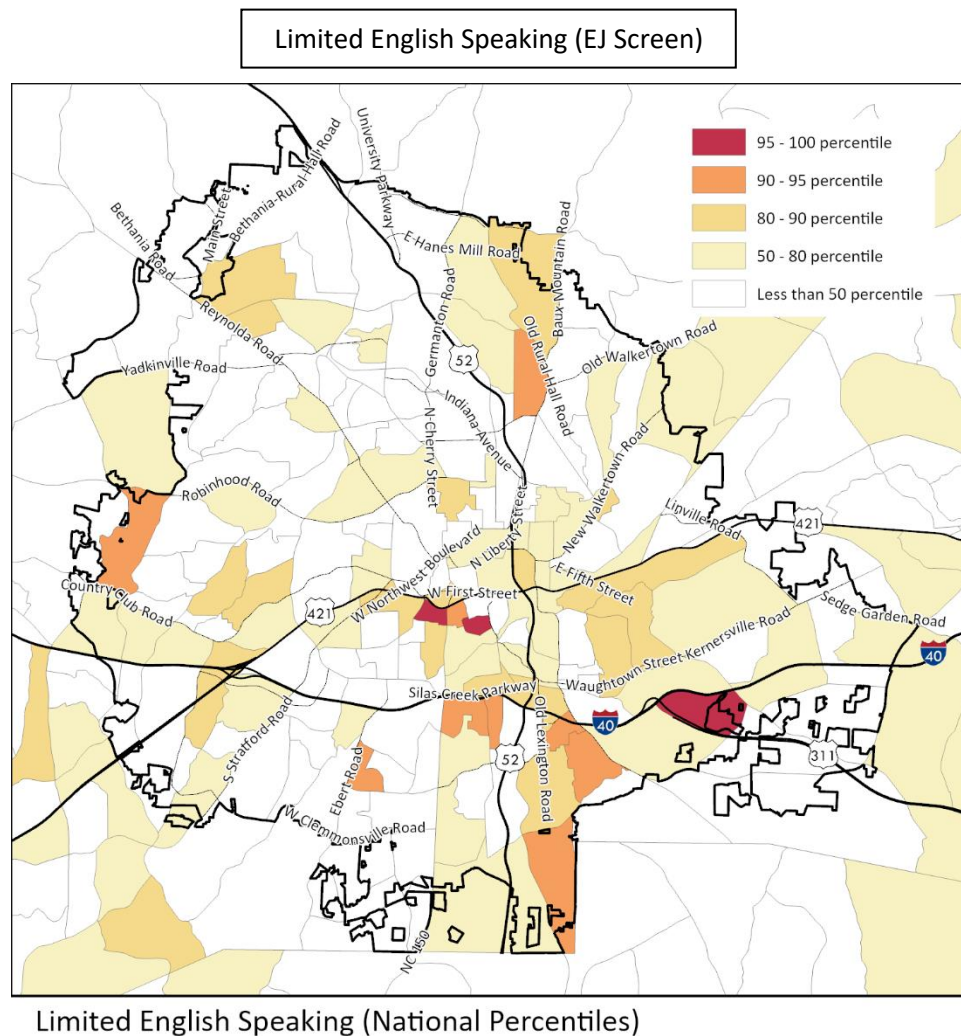
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Other Vulnerable Populations

Other demographics that are considered important to identify an area's vulnerable population are limited English speaking and persons with disabilities because these identifications tend to limit access to services and processes.

Most wards have pockets of limited English speaking.

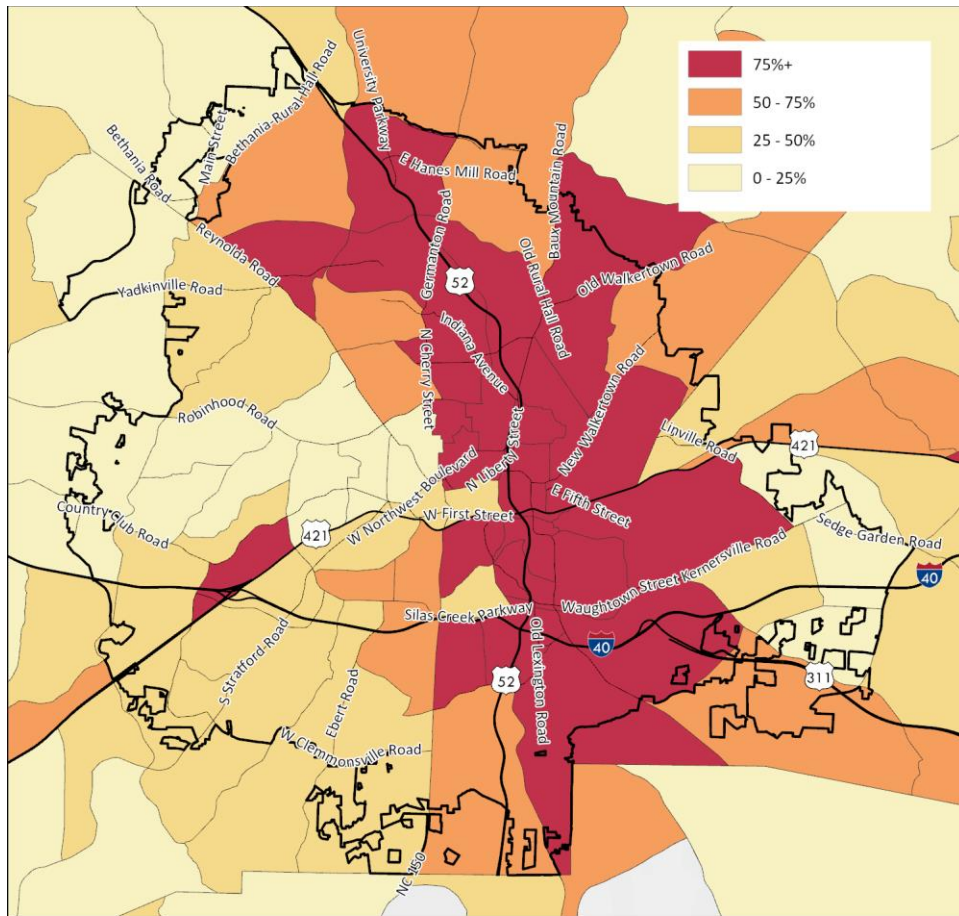


Persons with Disabilities Index (EJ Screen)



⁶ Social Vulnerabilities Index uses US Census data to determine relative social vulnerability. It uses a combination of socioeconomic, housing type, transportation, minority status, and other demographic factors.

DOE Social Vulnerability Index



Social Vulnerability Index

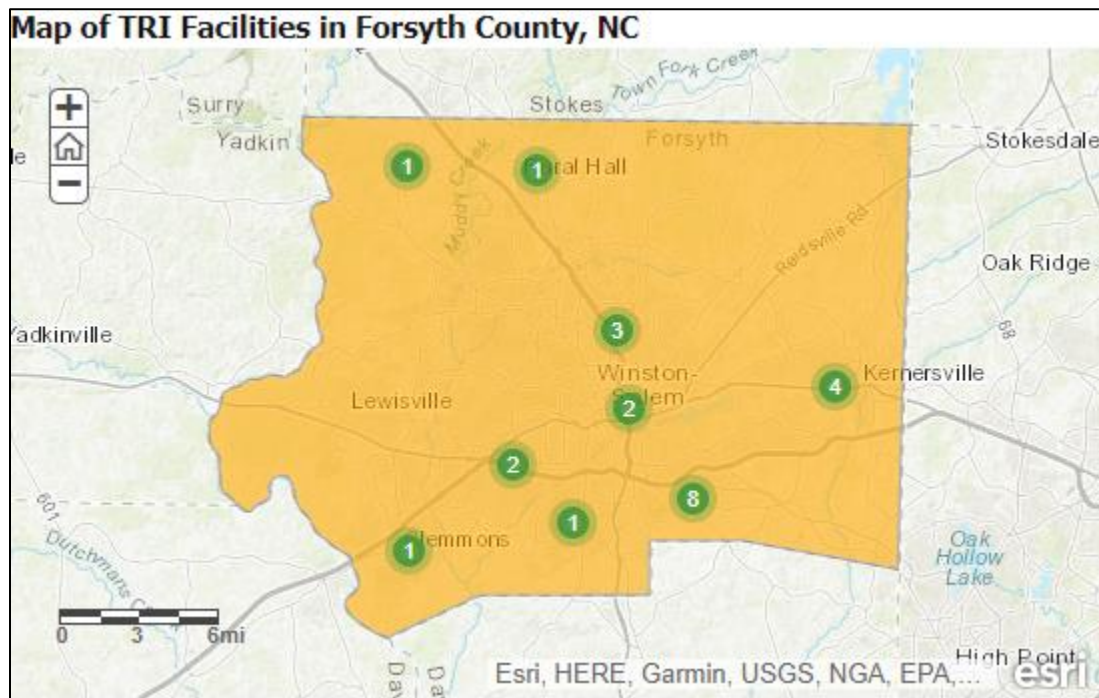
Environmental Hazards

In 2023, the American Lung Association reported on the State of the Air. 36% of Americans live in places with failing grades for unhealthy ozone or particle pollution levels. People of color are 3.7 times more likely to live in a location with failing grades.

Forsyth County is responsible for monitoring air pollution and enforcing air quality rules and regulations.

Toxic Air

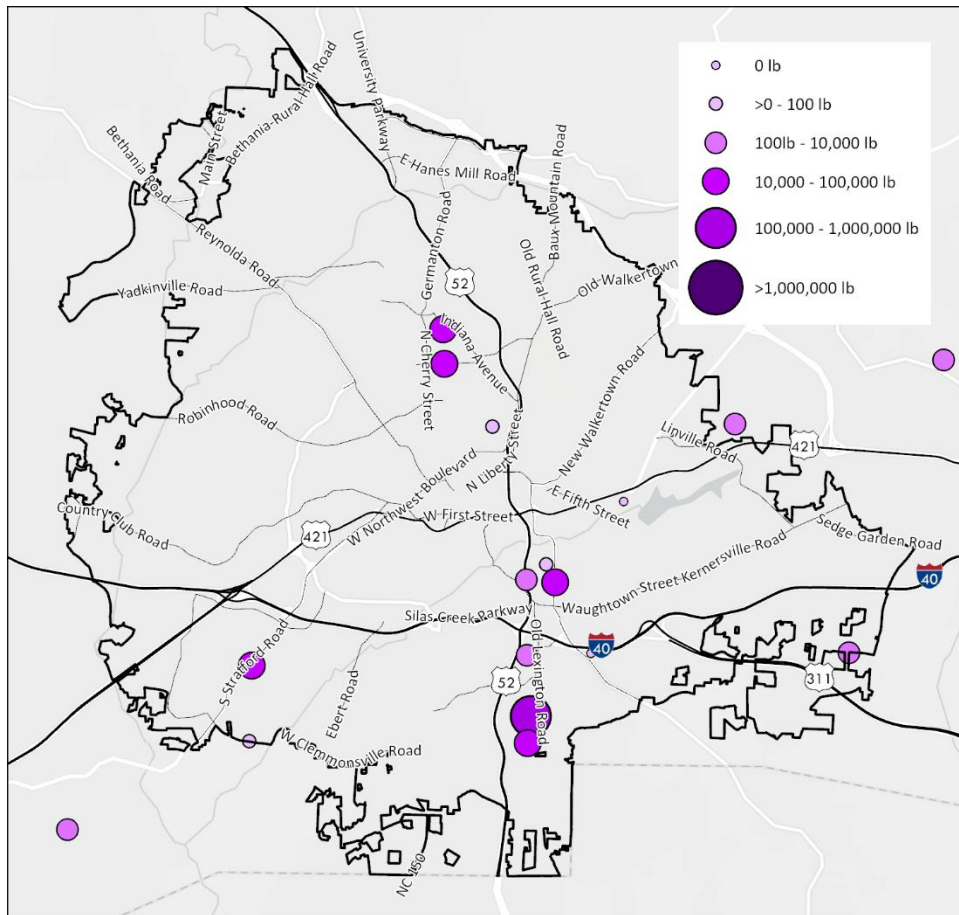
The Environmental Protection Agency (EPA) tracks Toxic releases into the air⁷. When facilities release certain toxic chemicals into the air, they must report these releases to the EPA. This information helps the EPA monitor pollution levels, understand the potential health risks to nearby communities, and find ways to reduce harmful emissions. According to the latest Toxic Release Inventory (TRI) available, 2022, North Carolina ranks 17 out of 56 states/territories nationwide based on total releases per square mile (Rank 1= highest releases). In Forsyth County, there were 24 TRI facilities. The map below shows the approximate location of these facilities and number at each location.



Each number in green represents the number of TRI regulated facilities in the area.

⁷ Toxic Release data is delayed and not published for at least 2 years, so this is historical data. The Toxic Releases to air indicator measures the average annual chemical concentrations in air weighted by the toxicity of each chemical. A “release” means that it is emitted by a regulated facility into the air. EJScreen quantifies potential health impacts, not actual impacts.

Toxic Releases Reported for 2022



Toxic Release Inventory (City)

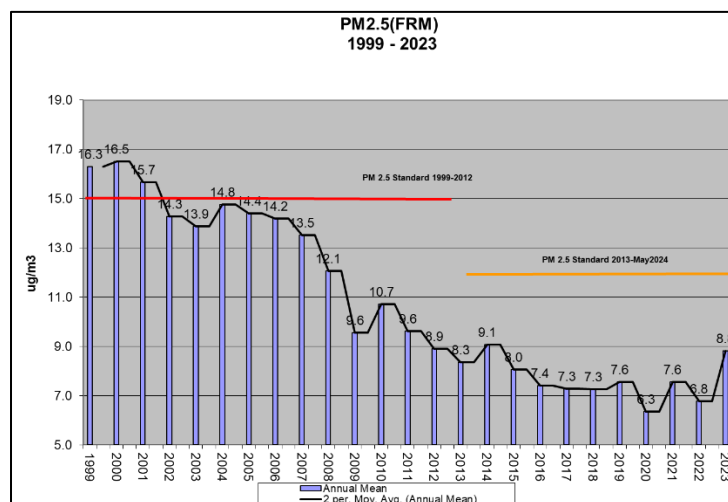
At the intersection of East and the Southeast Ward, Structural Steel of Carolina has been cited by ProPublica⁸ as one of the worst sites in the US with 2.0 times the EPA's acceptable risk of incremental lifetime cancer risk due to emissions from nearby facilities. The purpose of ProPublica's ranking is to bring attention to the facility's environmental impact and pushes for greater accountability, regulation, and, ideally, improvements to reduce emissions and protect public health.



⁸ ProPublica is an independent, non-profit newsroom known for investigative journalism

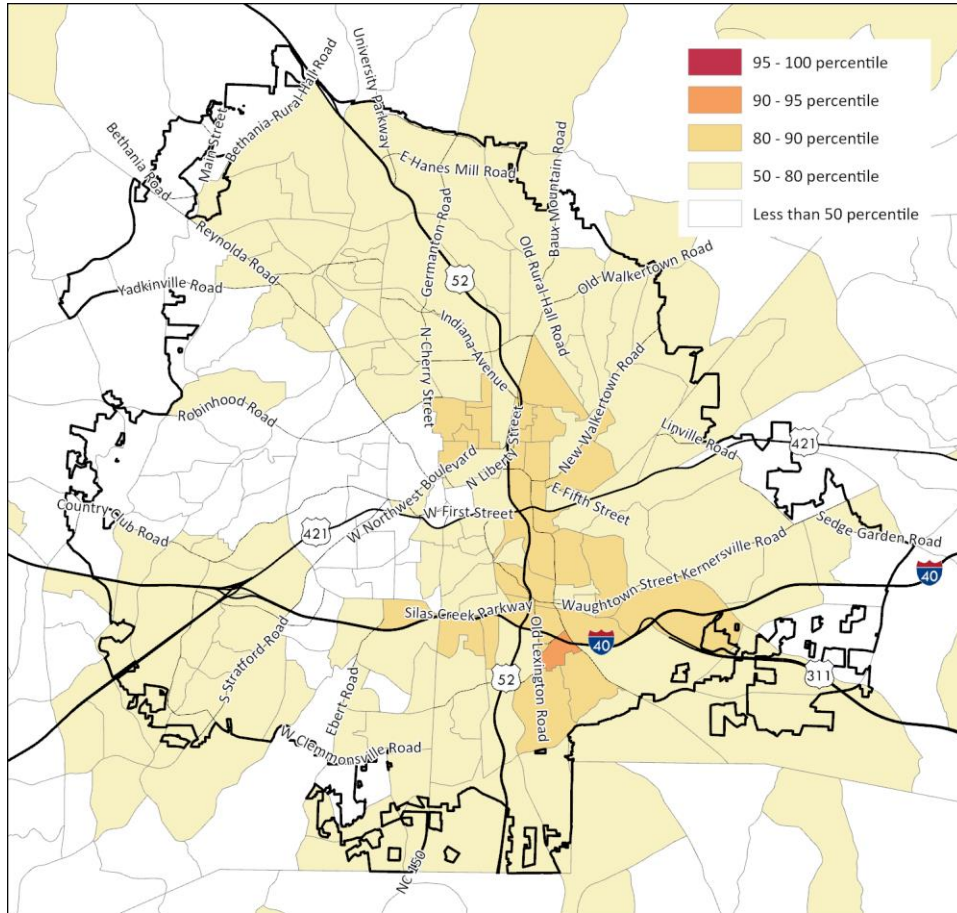
Particulate Matter

Overall, that means that Winston-Salem meets all EPA standards. 2023 showed an increase due to national exposure to Canadian wildfires. In the data below provided from Forsyth County, the EPA's annual standard (12-month average) changed in 2012 to be more protective. On May 4, 2024, the standard dropped to 9.0 micrograms per cubic meter.



The overall particulate matter in Winston-Salem is under 50 percentile nationally, meaning the City does not have excessive PM. The Particulate Matter Index below shows how the EPA uses demographic information that indicates social vulnerability to create the indexes of areas to be aware of with future projects and planning. The highest environmental justice index to Particulate Matter (PM) 2.5, is in the Southeast Ward. PM is a mixture of solid and liquid particles in the air that can increase the risk of health problems, including heart disease, asthma, and low birth weight. Common sources are vehicle exhaust and burning wood.

Particulate Matter 2.5 EJ Index (EJ Screen)



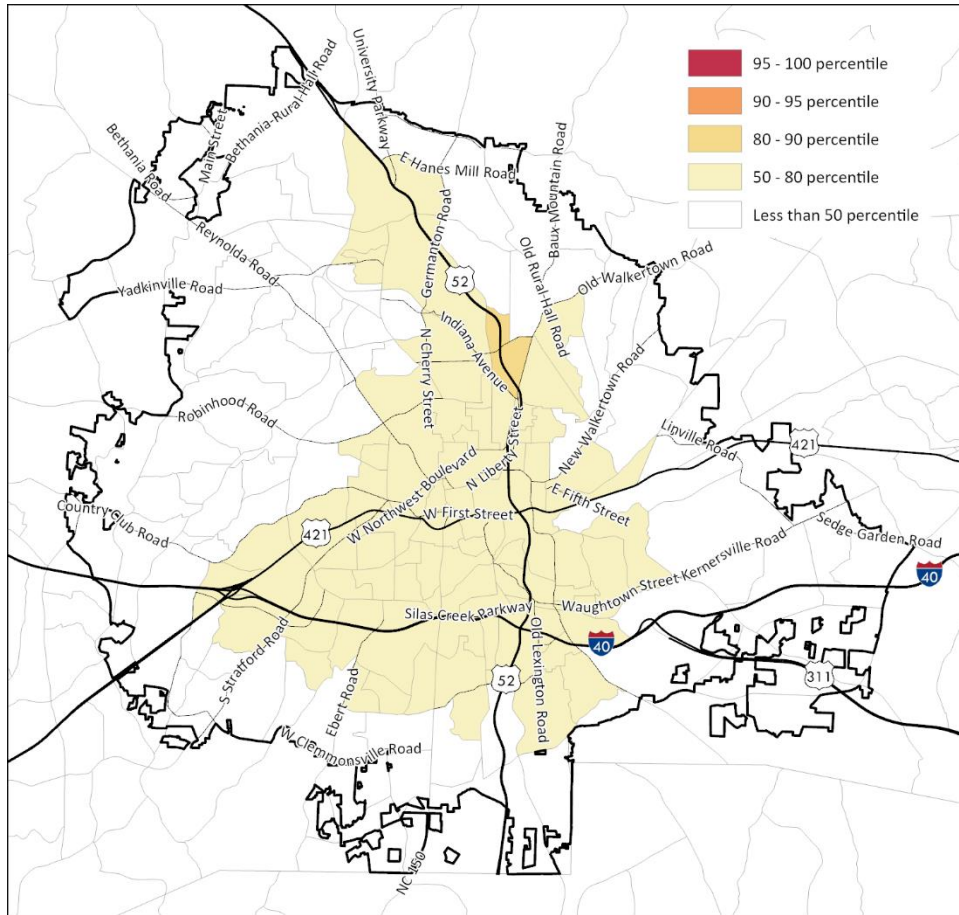
Particulate Matter 2.5 (EJ Index)

During the Winston Weaver plant fire in 2022, the PM 2.5 levels rose to 1,750 micrograms per cubic meter, which is more than 5 times the amount that the EPA considers hazardous⁹.

The highest exposure to Diesel Particulate Matter, a type of particulate matter that comes specifically from diesel engines, is in the North, near the airport. Although diesel trucks are a major source of particulate matter for localized air pollution, airports emit particulate matter through aircraft engines and ground support equipment. Aircraft emissions during takeoff and landing cycles include nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compounds (VOCs), in addition to particulates, which can exacerbate air quality issues.

⁹ See appendix showing that average concentrations in 2022, despite Weaver plant fire, were still under many areas in the State

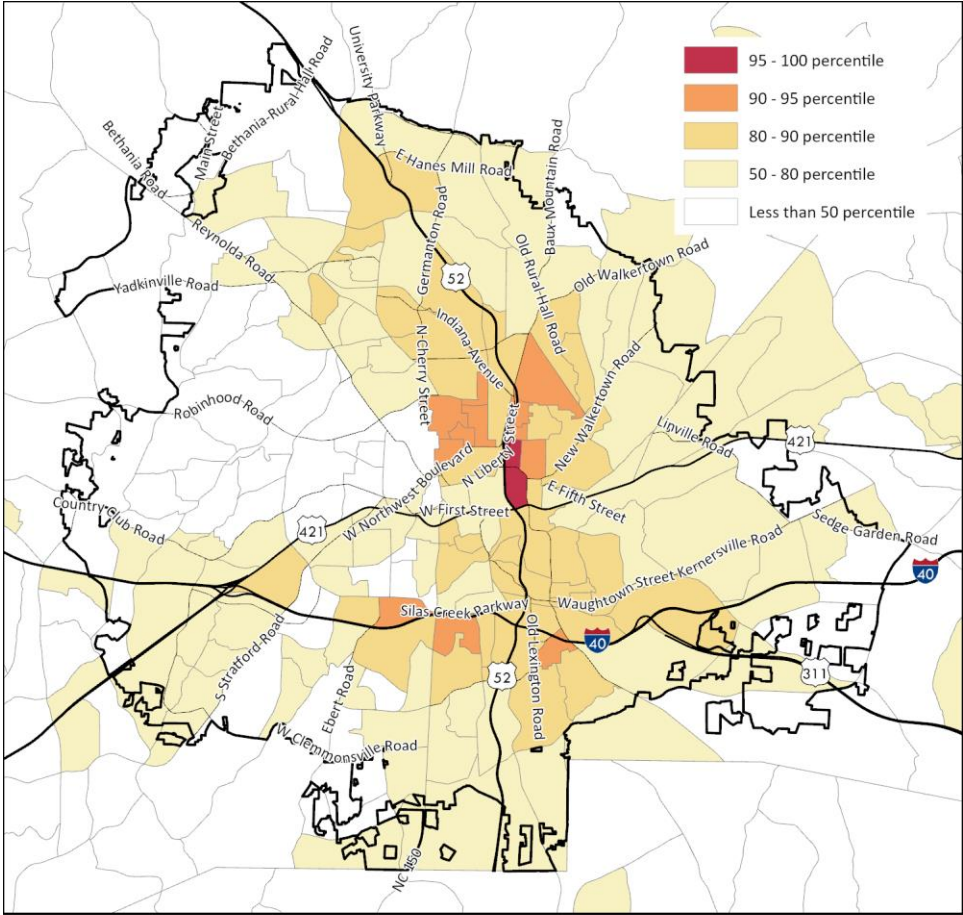
Diesel Particulate Matter Exposure (EJ Screen)



Diesel Particulate Matter (Environmental Burden - City)

When Diesel Particulate Matter is combined with demographic index, it creates an environmental burden indicator that shows a heavier burden in the East and North. Like PM 2.5, the index highlights vulnerable groups that should be protected from increases in particulate matter, and if possible, actions that lower their vulnerability and/or their exposure.

Diesel Particulate Matter EJ Index (EJ Screen)
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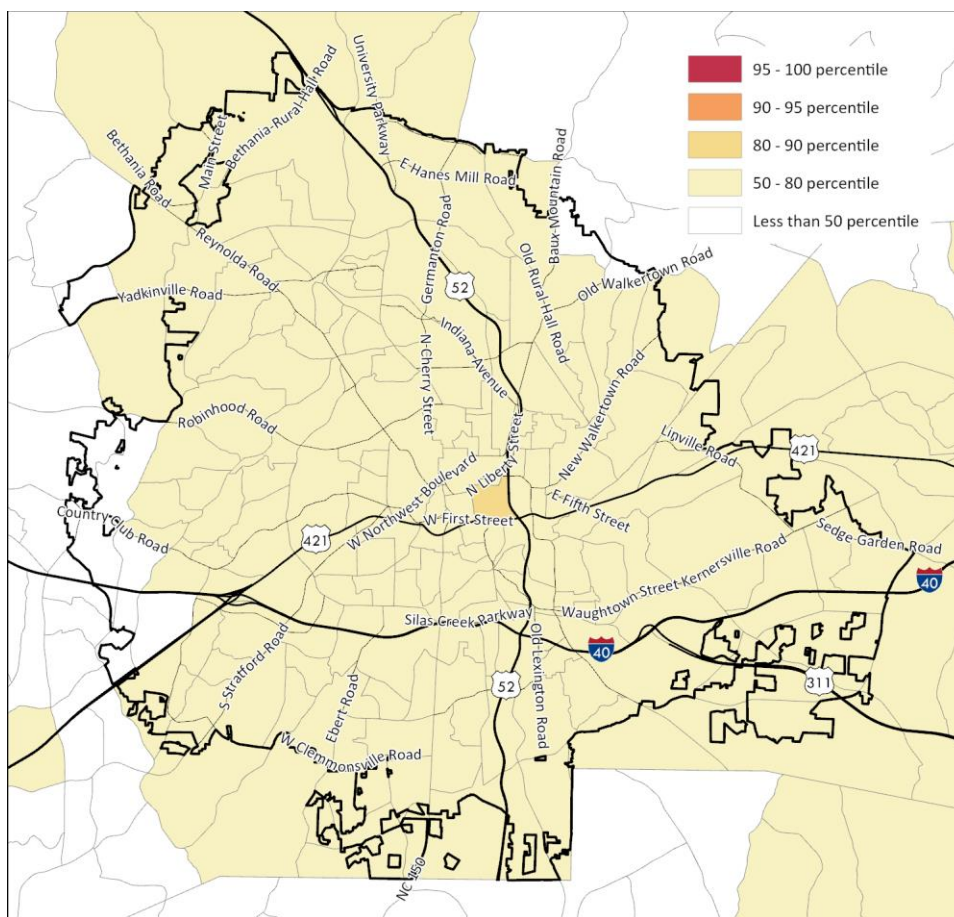


Diesel Particulate Matter (EJ Index)

Hazardous Waste

Although the overall distribution of hazardous waste proximity is fairly even. The whole city is in the 50+ percentile for the nation. Hazardous waste proximity is often noted as location to brownfields, which may be indicative of historical industrial areas. The concentrated section is near downtown (see second map).

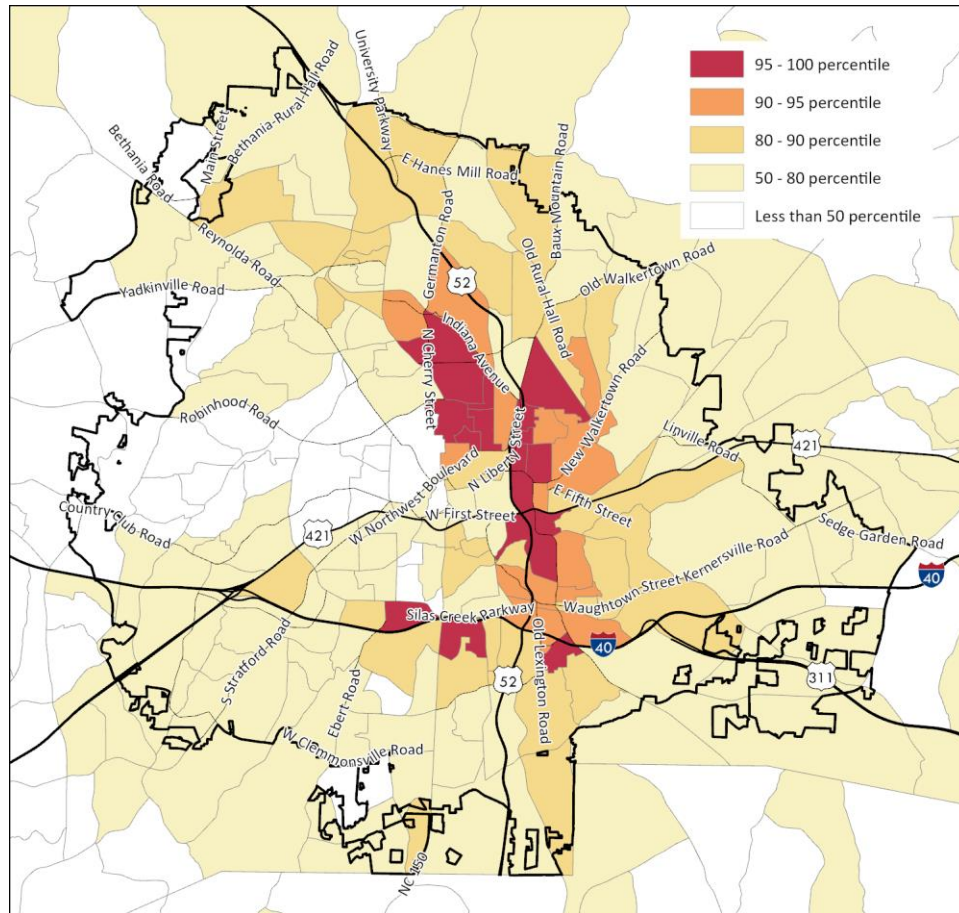
Hazardous Waste Proximity (EJ Screen)



Hazardous Waste Proximity (Environmental Burden - City)

The areas of Winston-Salem that are identified as Hazardous Waste Burden Indicator are concentrated in the North and Northeast Wards.

Hazardous Waste EJ Index (EJ Screen)

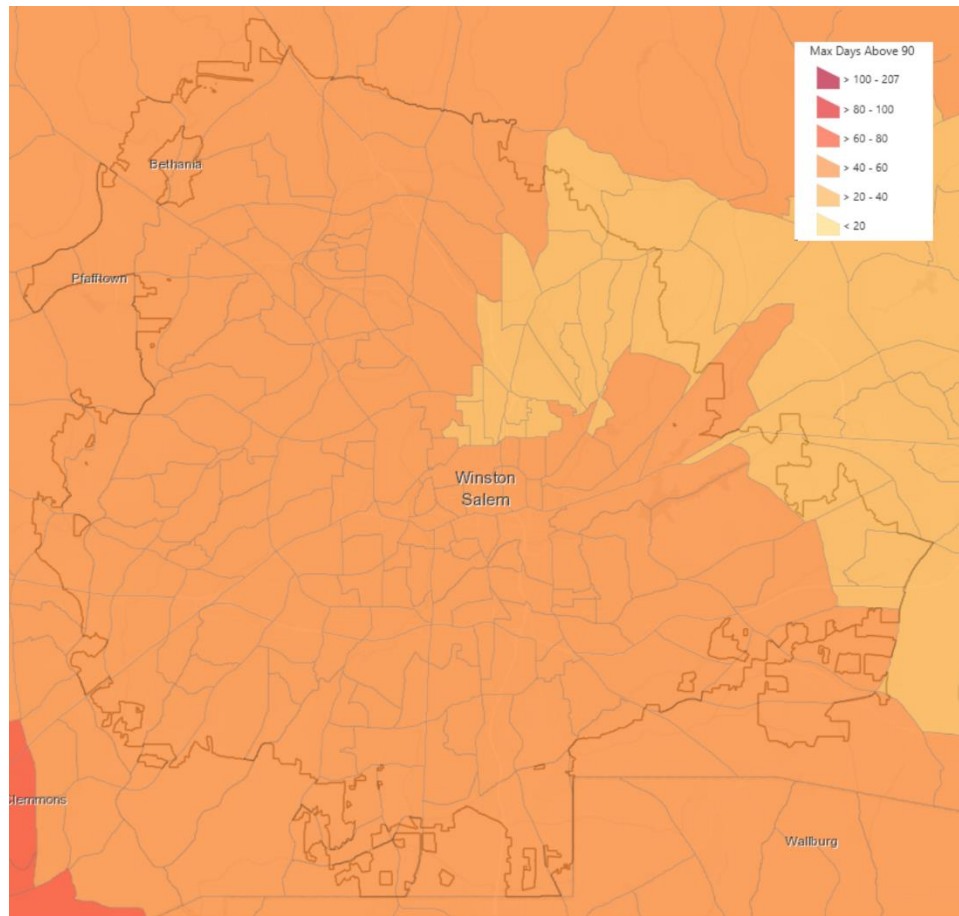


Hazardous Waste Proximity (EJ Index)

Urban Heat

Urban heat is a growing risk with climate change. The EPA EJ Screen tool notes that most of Winston-Salem has had 60 or more days of extreme heat risk. The north is slightly lower, which is typical with more rural, greener areas.

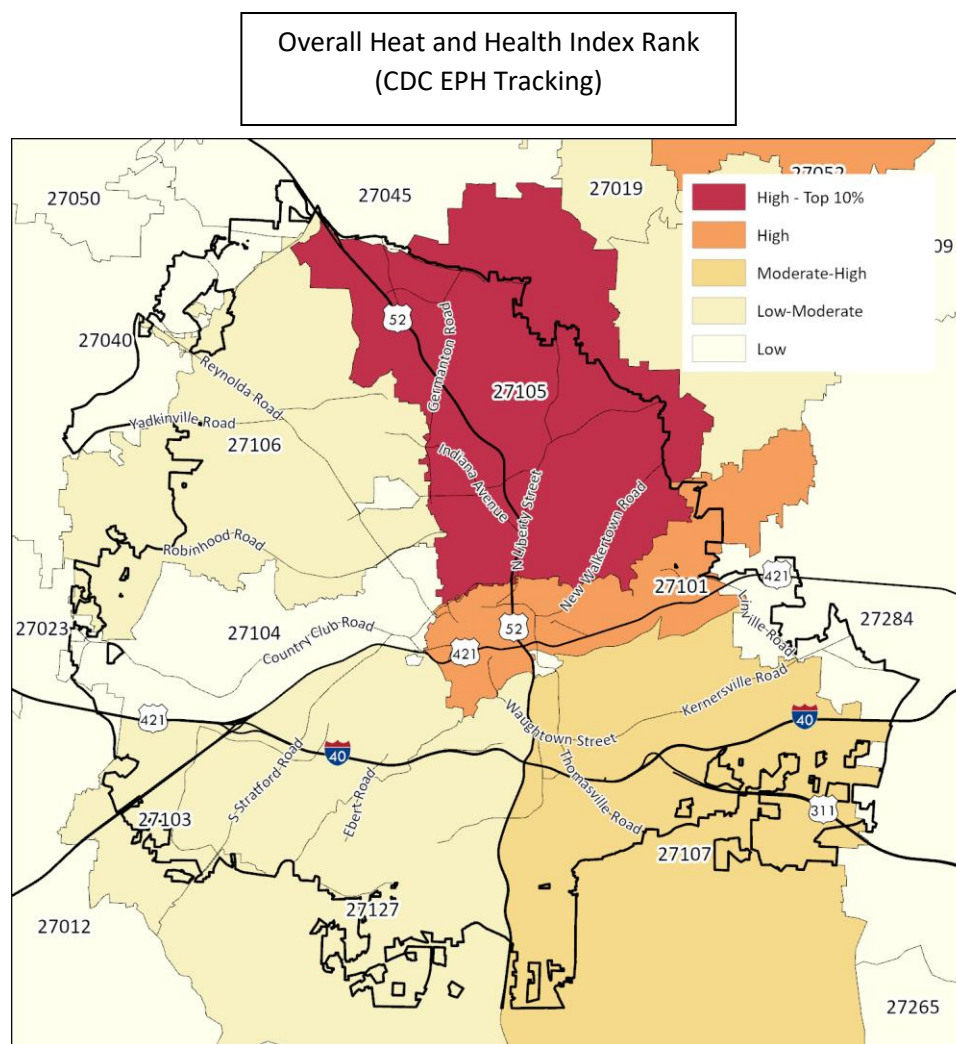
Extreme Heat (Max Days above 90) (EJ Screen)



Extreme Heat (City)

The Centers for Disease Control (CDC) tracks heat and health risk. Forsyth County shows up with a significant amount of risk. The zip code 27105 rates is among the top 95.3% in the country in terms of heat and health index. This is based on high prevalence of sensitivities such as asthma, chronic obstructive pulmonary disease, coronary heart disease, obesity, and poor mental health;

sociodemographic vulnerabilities¹⁰; and historical experience with heat-related events. Zip code 27101 is second in heat risk at 85.2% of the country.



Overall Heat and Health Index Rank

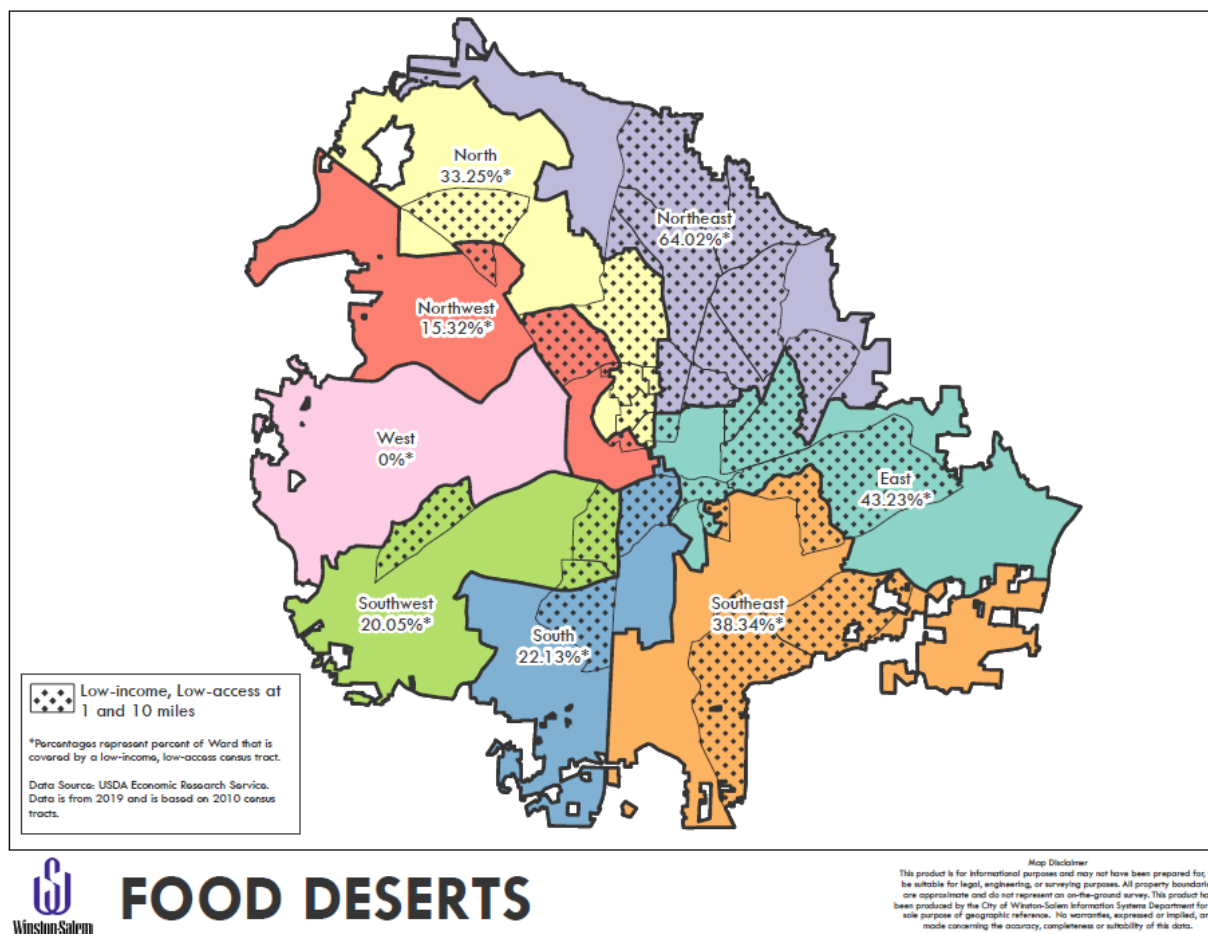
¹⁰ These typically include income, race, age, and gender items.

Residential Environmental Justice Items

Food Insecurity

According to the USDA and Feeding America, the Food Insecurity rate for Forsyth County is 13.2% of the population, or 49,560 in 2019. The USDA defines a food desert relative to both the poverty rate of an area and its proximity to a nearby full-service grocery store¹¹. In urban areas, at least 500 people, or 33% of the population, must live more than 1 mile from the nearest grocery store to qualify as a food desert. 20+ food deserts have been identified in Winston-Salem.

USDA Food Deserts, by Ward

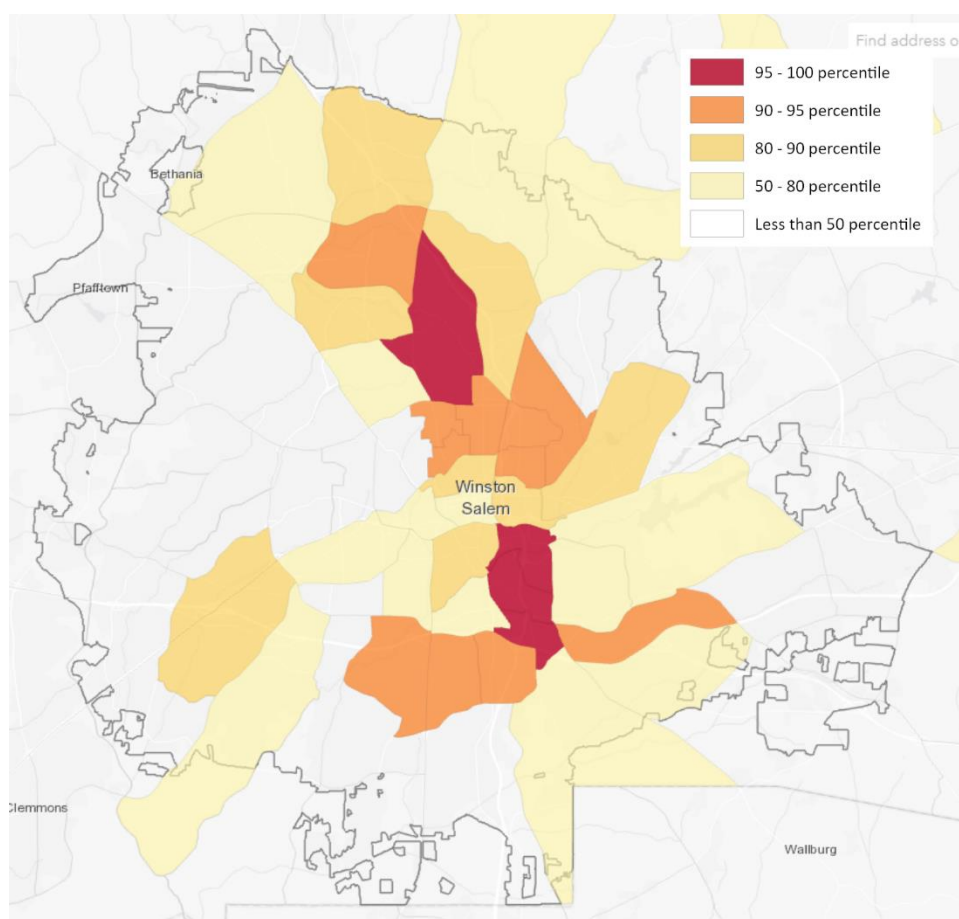


¹¹ Bodegas, corner stores, etc. do NOT count towards grocery stores in this definition.

Burdens on Income

The Housing Burden¹² (EPA EJ Screen¹³) is calculated by identifying census tracts where households earn less than 80% of the Housing and Urban Development's Area median Family Income and spend more than 30% of their income on housing costs. The highest housing burdens are in the South and North Wards.

Housing Burden (EJ Screen)

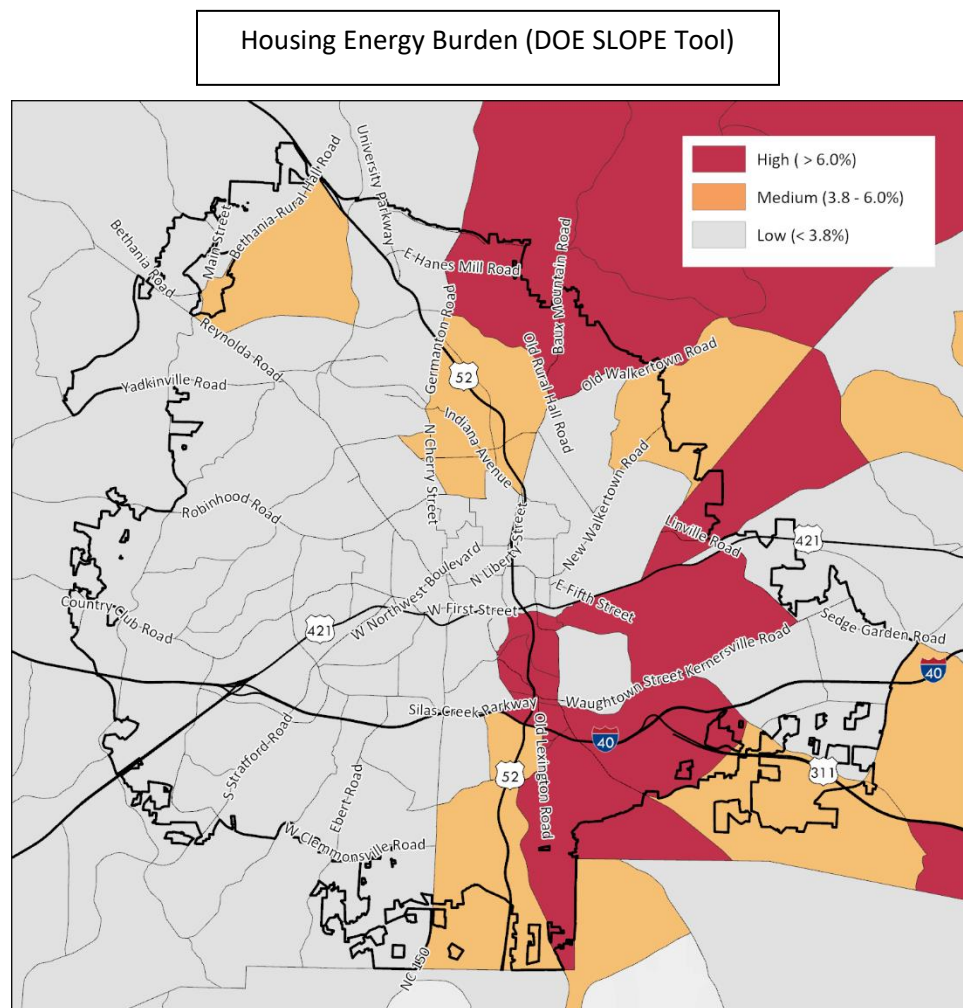


Housing Burden

¹² Percentile is the share of households that fit the housing burden description.

¹³ <https://www.epa.gov/ejscreen>

The Housing Energy Burden (DOE SLOPE Tool¹⁴) is based on the % of household income spent on energy and transportation. Energy is concerned a burden when it is greater than 6% of income. The most burden is felt by Census Tract 3.02 in the North Ward¹⁵, whereby the energy burden is 6.18%.



Housing Energy Burden

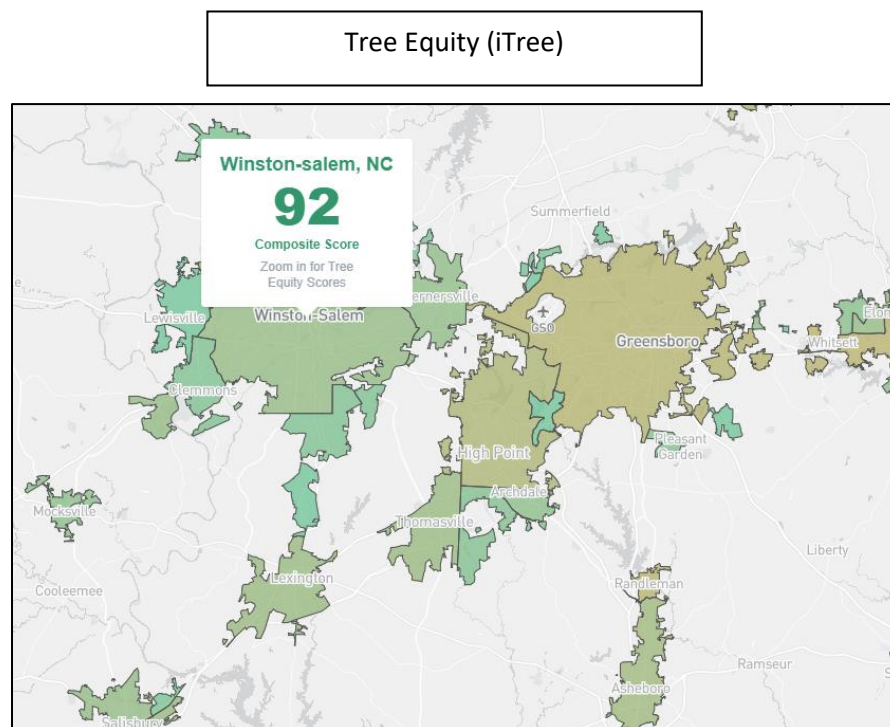
¹⁴ Run by the National Renewable Energy Lab (NREL) <https://maps.nrel.gov/slope/>

¹⁵ This tract is in the Boston-Thurmond area

Tree Canopy

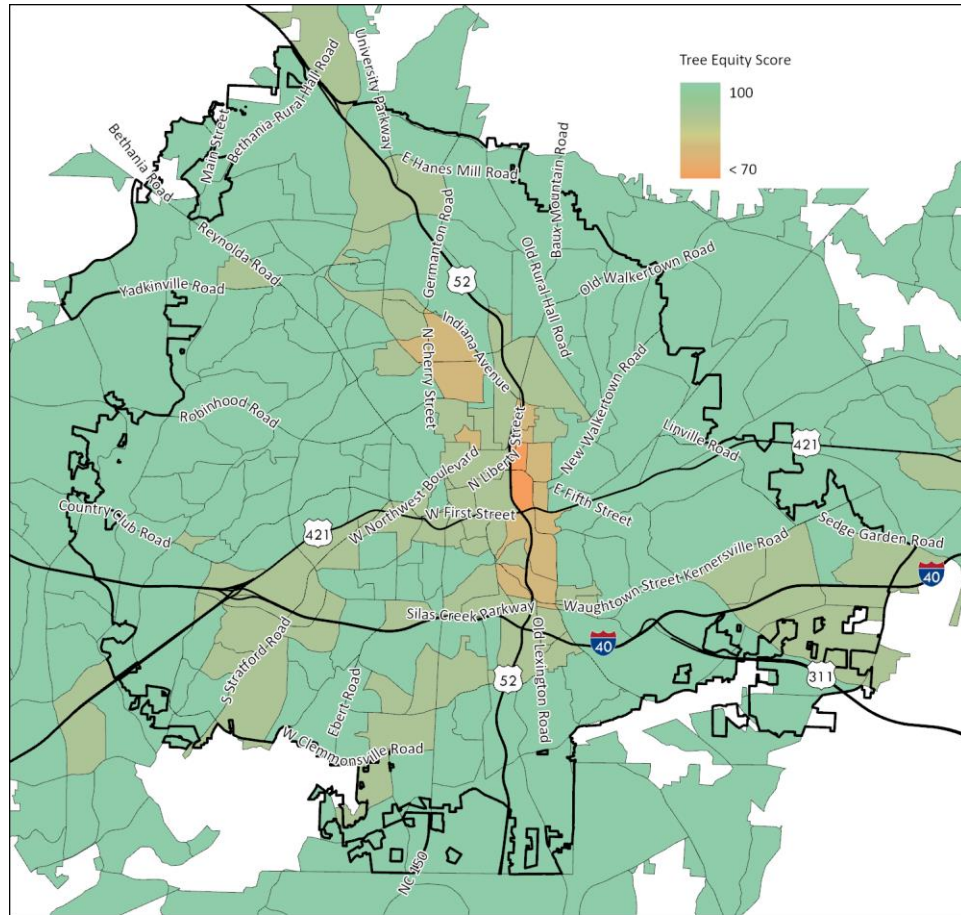
Environmental justice is not only about exposure to negative environmental factors, like pollution, but also about unequal access to positive benefits, such as the cooling, health, and aesthetic advantages provided by trees. Tree canopy plays a vital role in mitigating the urban heat island effect, where cities experience significantly higher temperatures than surrounding areas due to heat-absorbing surfaces like asphalt and concrete. A healthy tree canopy provides shade, cools the air through evapotranspiration, and reduces energy costs by lowering the demand for air conditioning in nearby buildings. Additionally, trees improve air quality by filtering pollutants, enhance stormwater management by reducing runoff, and increase biodiversity by providing habitat for wildlife.

The Tree Canopyⁱⁱ in this report was created using tools by the Trust for Public Land. It uses satellite photos and AI to measure tree canopy. In addition, the Trust for Public Land and American Forests, developed a Tree Equity Score for cities throughout the US as a guide to investment in tree infrastructure. Tree Equity represents a nationwide score. The lower the score, the greater priority for tree planting. A score of 100 means that a neighborhood has enough trees. In Winston-Salem, the overall Tree Equity Score¹⁶ is **92** (approximately 43% tree canopy); however, in one census block, near Liberty St and 12th street, it is as low as 59 (approximately 20% tree canopy). This represents an additional 12.9 degrees that the neighborhood faces than the rest of the city.



¹⁶ <https://www.treeequityscore.org/>

Tree Equity (iTree)

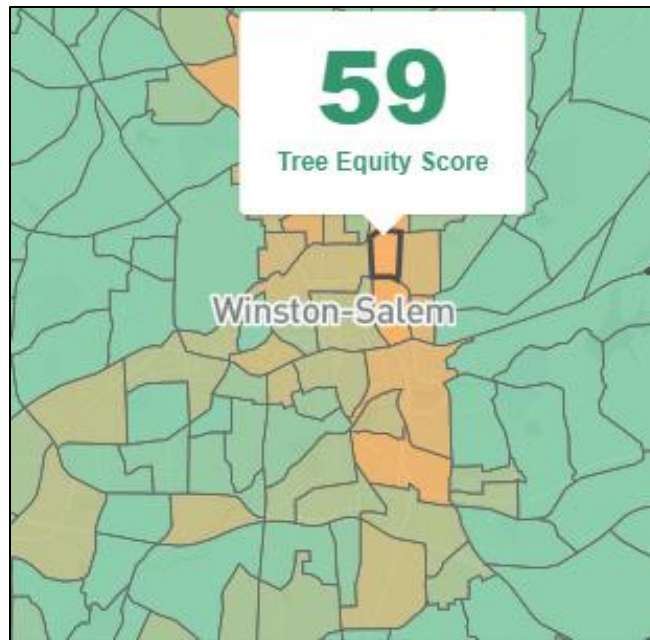


Tree Equity (City)



Tree Equity Score

Close-Up of Lowest Scoring iTree Tree Equity Score



Parks

Parks provide close-to-home opportunities to exercise and experience the outdoors, which are essential for physical and mental well-being. Studies have shown that parks also make communities more resilient to the effects of climate change and help bring neighborhoods together.

ParkScore¹⁷ for cities across the US based on residents' ability to reach a park within a 10-minute walk. 10-minutes having been defined as the distance because most city residents will not walk more than 10 minutes to get to shopping, transit, or parks. Winston-Salem rates at **83** out of 100, with 1 being highest.

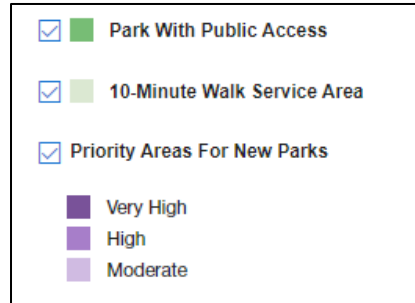
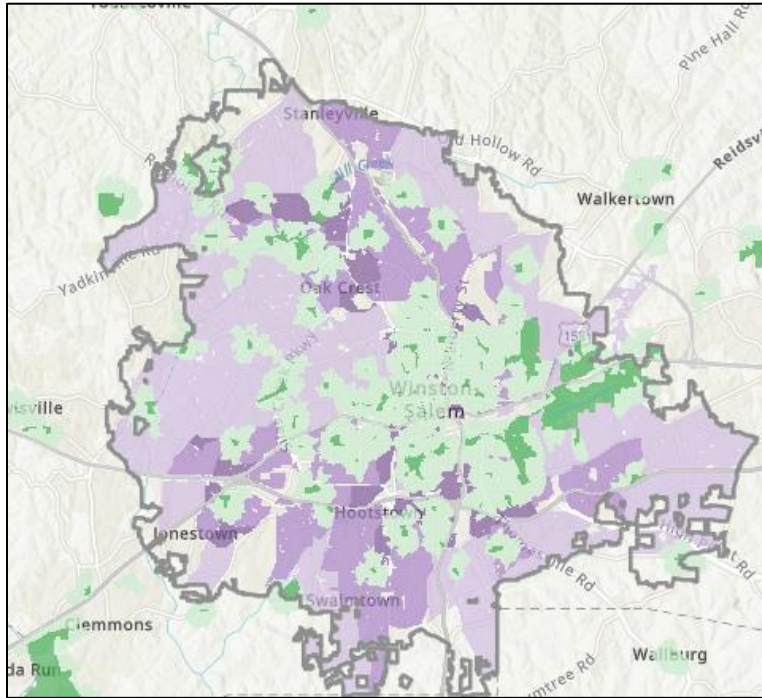
5% land area of Winston-Salem is used for parks, versus the National median of 15%. While the overall rating is based on low access to parks (only 37% live within a 10-minute walk versus the median city at 55% and 74% of the most populous), the score also reports on the differences between ages, race, and income. Winston-Salem has equal access by age, and slightly higher access by lower income (46% of lower income residents have access versus 31% of high income). Winston-Salem is more equitable than many cities in that 46% of Black residents have access to a park within a 10-minute walk (versus the overall 37% average of the city).

ParkScore/Park Serve¹⁸ creates a map of areas that should be served by future parks, mapping areas that fall outside of the 10 min walk to a park and normalized by density. Most of Winston-Salem's identified areas are in the suburban areas (purple areas in the map below).

¹⁷ <https://www.tpl.org/parkscore>

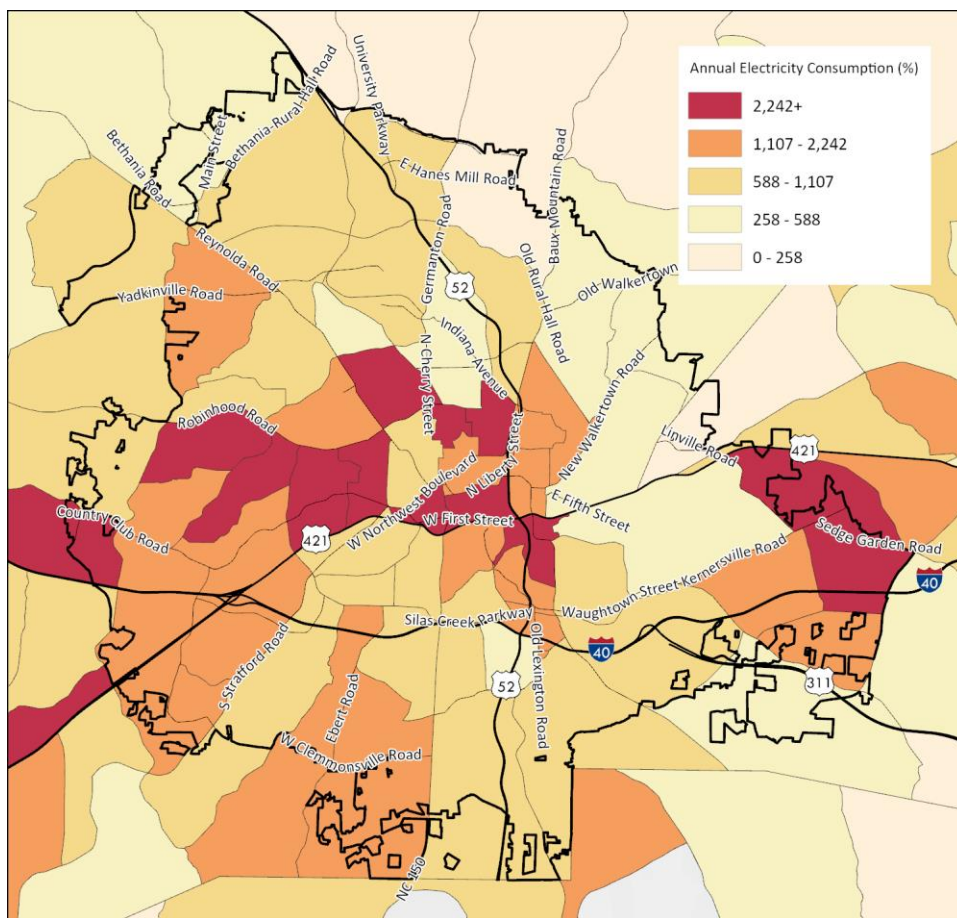
¹⁸ <https://www.tpl.org/parkserve>

Suggested Future Parks to Achieve 10 min
Walk to Park (ParkServe)



Possible Renewable Energy

Based on electricity consumption, DOE's SLOPE tool¹⁹ creates a possible offsetable electricity consumption of low-to-moderate income households. Offsetable electricity consumption for the residential sector is the percent of annual electrical consumption that can be provided by behind-the-meter distributed solar photovoltaic (PV) (rooftop and ground-mount). This represents a special interest in the Inflation Reduction Act grants for households to add solarⁱⁱⁱ.



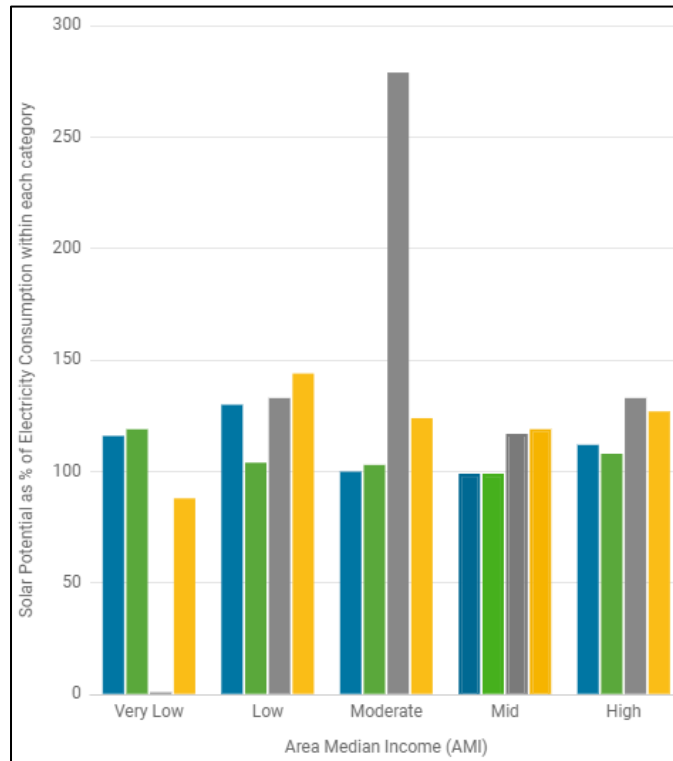
LMI Residential Solar Offsetable Electricity Consumption

More detail is available at the County level²⁰, which shows that there is not a huge discrepancy between owner and rental occupied homes, except in the multi-family homes.

¹⁹ Provided by the National Renewable Energy Lab <https://maps.nrel.gov/slope/>

²⁰ Uses 2020 data

Residential Solar Potential (DOE SLOPE Tool)



Data Filters ⓘ

- Multi-Family, Renter Occupied
- Multi-Family, Owner Occupied
- Single Family, Renter Occupied
- Single Family, Owner Occupied

Conclusions and Recommendations

As cities grow and evolve, it becomes increasingly important to ensure that all residents, regardless of income, race, or geographic location, have equitable access to clean air, water, and safe living environments. Addressing environmental justice challenges involves recognizing the systemic disparities that have historically left certain communities vulnerable and ensuring that future planning and development prioritize sustainability and inclusivity.

The findings in this report serve as a foundation for understanding the environmental needs and concerns of our city's diverse populations. Moving forward, the insights gathered here can inform ongoing and future initiatives aimed at creating a healthier, more just city for all. Collaboration between community members, municipal leaders, and local organizations will be essential in shaping policies and programs that reflect the needs and aspirations of every resident. By applying an environmental justice lens to city planning and decision-making, we can foster a city where everyone has the opportunity to thrive in a safe, healthy, and equitable environment.

This report uses information from the Environmental Protection Agency (EPA), Department of Energy (DOE), Center for Disease Control (CDC), and other agencies to identify environmental justice gaps and vulnerabilities in Winston-Salem. This data may be used to guide city decision making for topics such as identifying needs for affordable housing, energy, transportation, air quality, food access points, and other items. By publishing this report, the City acknowledges the trauma that exists in the community, and it recognizes that we need to continue to seek to engage in constructive dialogue and action to leave a positive legacy. However, we also have to acknowledge that some of these maps may not change very much. For example, we may be able to encourage the addition of food access points, but if they are pantries, produce markets, or farmers markets, none of that will change the food desert calculation.

Based on the White House's Justice 40 Initiative, the Governor's resolution, as well as recommendations by the National League of Cities, it is recommended that going forward, the City takes the following steps:

1. Avoid, minimize, or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority populations and low-income populations
 - For example, do not plan for increase in density or low-income housing near toxic release facilities. Take measures to reduce diesel vehicles in areas with higher vulnerability to particulate matter.
2. Seek out and consider the needs of those traditionally under-served by existing systems, including but not limited to, low-income and minority households
 - For example, plant trees in areas of high heat and low tree canopy. Increase parks to Hispanic serving areas.

This data is also important for future concerns of climate resilience since areas that have greater burdens are likely to be less resilient to climate pressures. Future climate and strategic plans may include environmental justice elements embedded in them.

Examples of programs and/or goals that could be implemented:

- Emergency management planning and information to inform citizens of their risks based on residential location
- Low-income energy efficiency and rooftop solar installations
- Increasing electric vehicles (EV) and EV infrastructure to reduce particulate matter (PM) in city air
- Increasing public transportation to meet city needs to reduce overall personal vehicles on the road
- Plant trees in low canopy areas to decrease heat island effect and increase air quality
- Increase fresh food access points for food desert areas
- Increase transportation access for food deserts to reach specific food access points
- Ensure environmental representation within reasoning & new development projects to proactively provide comments and/or environmental mitigation tactics for communities in close proximity to environmental concerns

The City has applied for grants that address some of these environmental justice issues. Winning grants include planning for safe streets for pedestrians and funding to buy electric hybrid buses.

Sustainability

- FY-24- C-SITE- resilience hubs- Not awarded
- FY 24- CFI- public EV charging- Under review
- FY 24- NC EECBG- resilience hubs- Under review

Neighborhood Services

- FY 23- CoC Unsheltered Grant – Not awarded
- FY 24 – Youth Homeless Demonstration Program – Under review

Transportation

- FY 23- Reconnecting Communities- Not awarded
- FY 23- Bus and Bus Facilities- Not awarded
- FY 24- Bus and Bus Facilities – Win \$4.4M
- FY 24- Safe Streets for All – Win \$280K

Diversity, Equity and Inclusion

- FY 24- Fair Housing Initiatives Program (21B) – Under review

The City is also taking action in other ways:

- Solar Installations
 - The City added its first solar rooftop installation on the Byrce A. Stewart building in December 2023

- The City has participated in the Steering Committee of the Solarize the Triad community solar project.
- EV Charging
 - The City applied for the Federal Highway Administration's Charging and Fueling Infrastructure (CFI) program, which would help increase the amount of public EV charging infrastructure, if funded, and include more than 40% in Justice 40 areas.
- Food Resilience
 - The City recently undertook extensive community outreach to understand the challenges and possible solutions of the food system in Winston-Salem and its food deserts.
- Tree Canopy
 - Roots Day, the City's tree planting program, has focused on increasing low canopy areas.
- City Planning
 - The upcoming Forward 2045 incorporates several items of environmental justice and speaks specifically about Reparative Planning.
- Job Development
 - Winston-Salem's job development department, SOAR and Positive Path programs, is partnering with Solarize the Triad to explore ways to increase access to green jobs.

This report serves as a tool for guiding conversations, shaping policies, and building partnerships that will drive progress toward a more sustainable and just future for our city.

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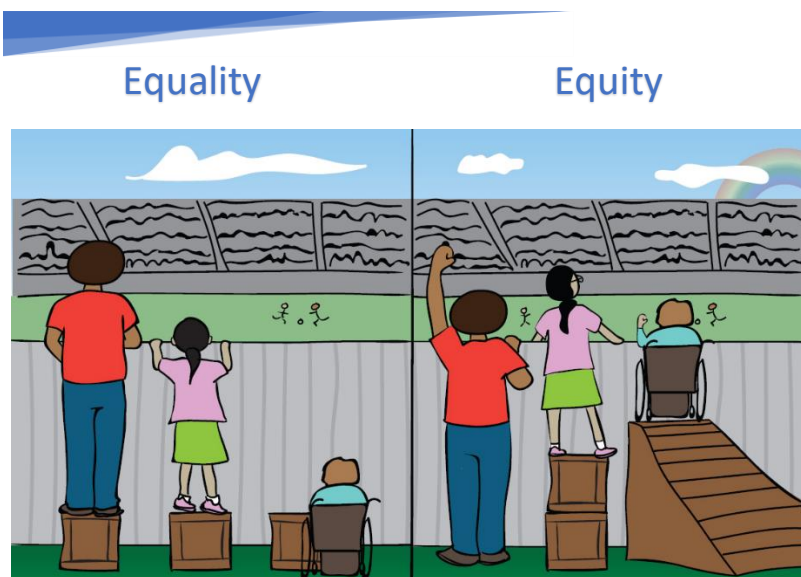
Notes about equity and the tools used

When discussing environmental justice, there is a key distinction between equality and equity.

Equality means providing the same resources and services to all residents, such as equal funding for public services, parks, or infrastructure projects across neighborhoods. However, this approach assumes that all communities have the same needs and starting conditions.

Equity, on the other hand, means recognizing that different neighborhoods and populations may face unique challenges and require different levels of support. For example, a low-income area might need more investment in affordable housing or transportation, while another community might need resources for flood prevention or health services. Equity ensures that city resources are distributed in a way that addresses specific needs and barriers, so all residents have the opportunity to thrive.

In city planning, equality is about offering the same; equity is about ensuring that all communities can achieve fair outcomes by addressing their unique circumstances.



This difference can be seen in some of the federal tools used to make this report. For example, EJ Screen uses the Index items (as seen in Diesel Particulate Matter and Hazardous Waste) to make an Equity Index. This means that the map (and thus scoring) is based on a combination of disadvantaged neighborhoods combined with actual levels of pollution and/or risk.

The environmental screening tools used in this report do NOT represent actual exposure or risk. Instead, these tools identify areas where vulnerable populations may be disproportionately impacted by

Understanding Overflow Theory: When Small Risks Add Up

Overflow Theory explains how multiple small risks, each seemingly safe on its own, can combine to create a larger, unsafe situation. For example, an individual pollutant might fall within safe exposure limits, but when combined with other environmental stressors—like poor air quality, unsafe drinking water, or inadequate housing—it can contribute to an overall harmful effect.

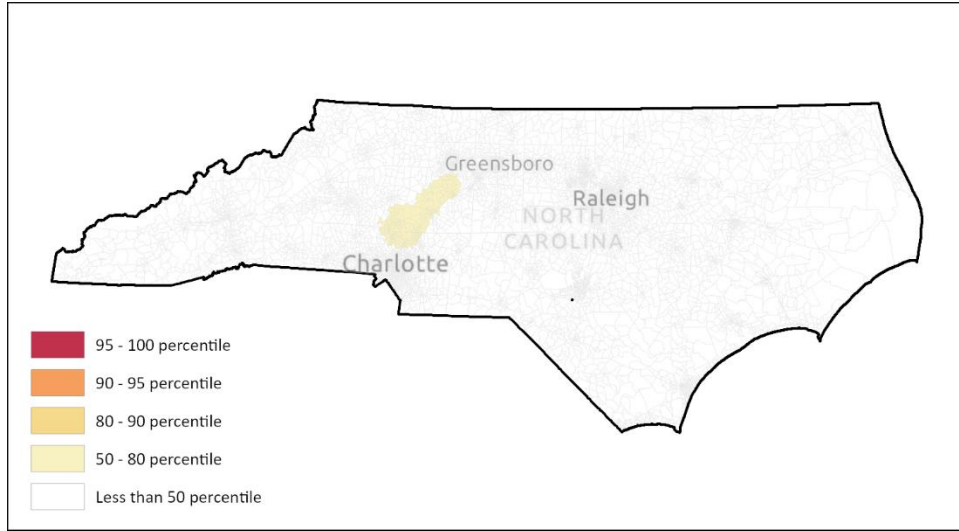
Just like a cup that can only hold so much water before it spills over, our health and communities can only handle so many challenges before they reach a breaking point. One issue on its own might not cause harm, but when other vulnerabilities—like pre-existing health conditions or social inequalities—are present, the combination can lead to significant negative outcomes. This concept emphasizes the need to address multiple risks in tandem to prevent "overflow" and ensure long-term well-being.

pollution and impacts of climate change. Nor do these tools or this report cover all aspects of environmental justice issues.

EPA's EJScreen is based on US Census Bureau American Community Survey. Toxic release inventory data is also reported to the EPA, but is at least two years old before it is released.

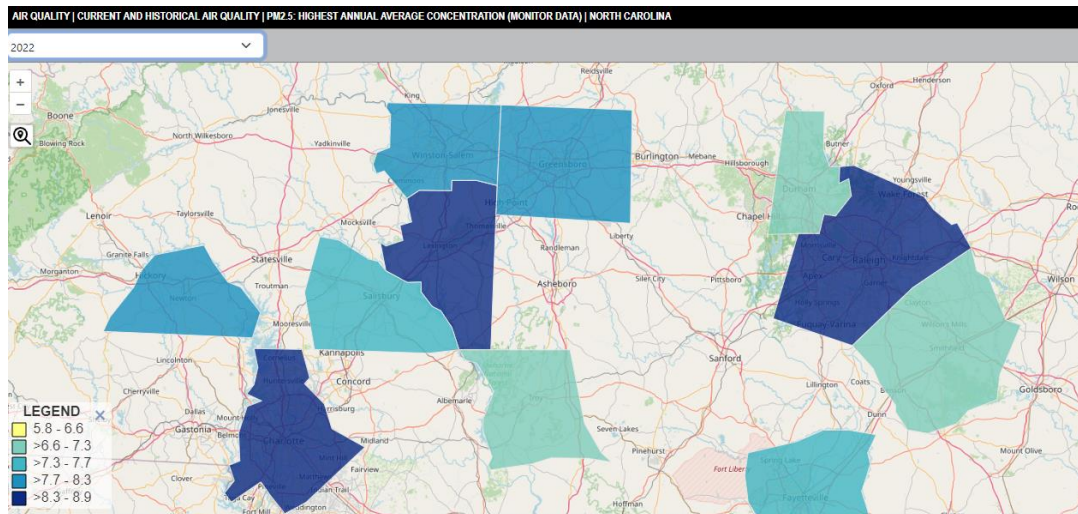
Appendices: State Charts

Particulate Matter 2.5 Indicator (EJ Screen)

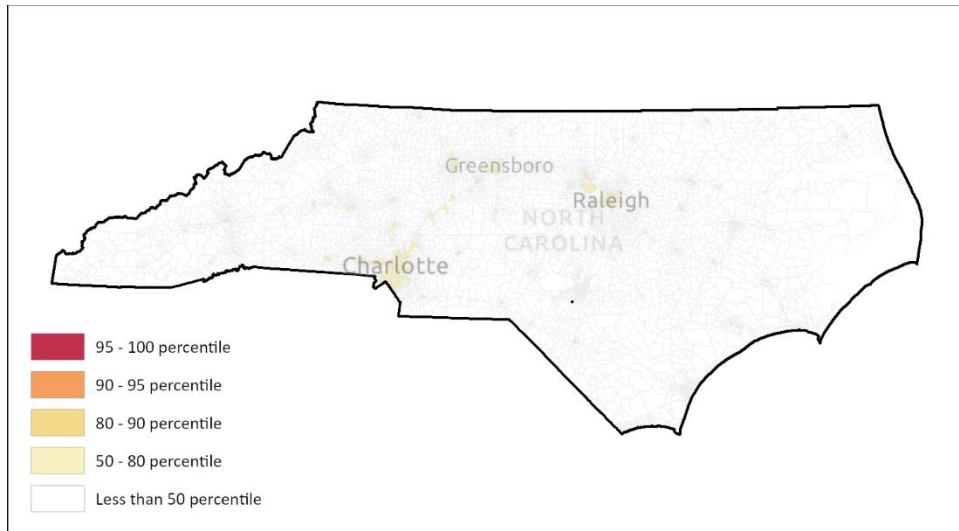


Particulate Matter 2.5 (Environmental Burden - State)1

Air Quality: PM 2.5 Highest Annual Average, 2022 Concentration, CDC

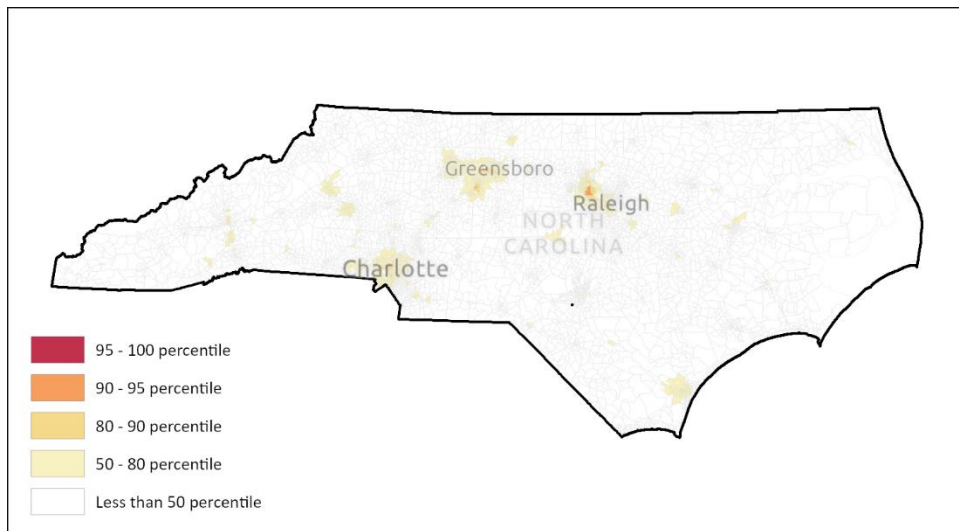


Diesel Particulate Matter Indicator (EJ Screen)



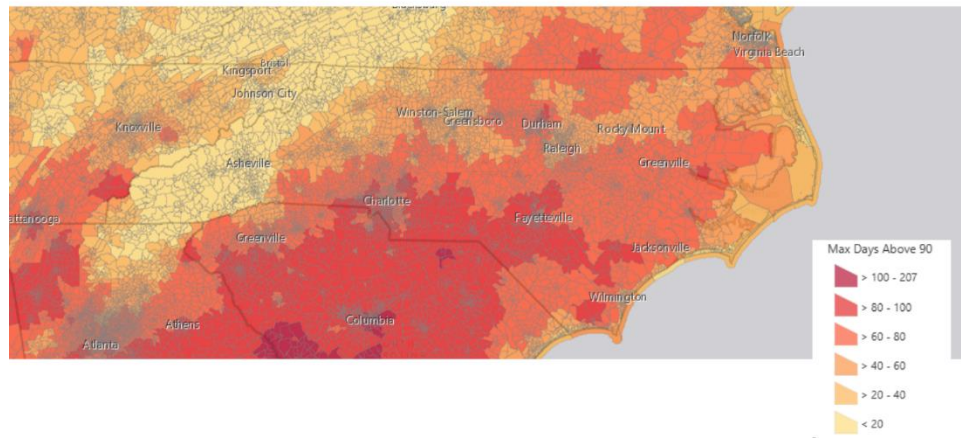
Diesel Particulate Matter (Environmental Burden - State)

Hazardous Waste Proximity (EJ Screen)



Hazardous Waste Proximity (Environmental Burden - State)

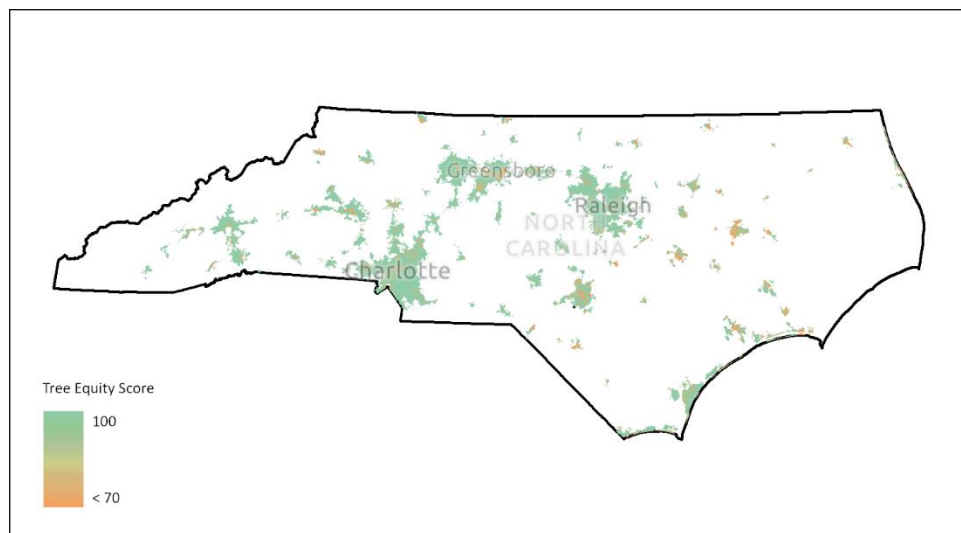
Extreme Heat (EJ Screen)



Extreme Heat (State)

Tree Equity

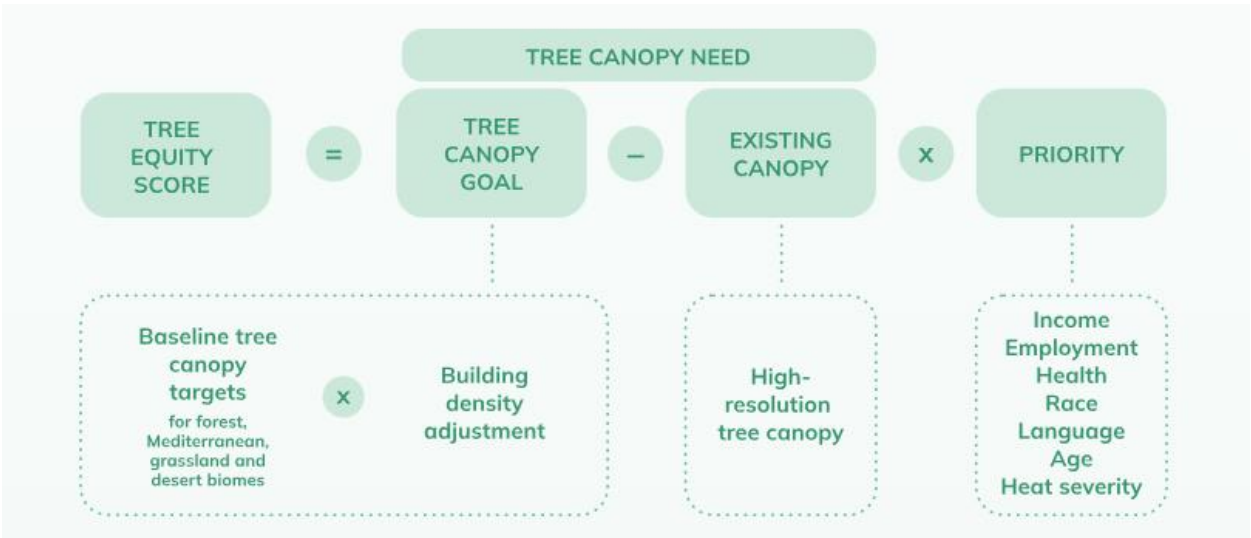
(White areas are not rated)



Tree Equity (State)

ⁱ Unless noted, maps were updated Sept. 2024

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ⁱⁱⁱ From Dec. 2023