

Air Quality at Foss Park, Somerville, MA

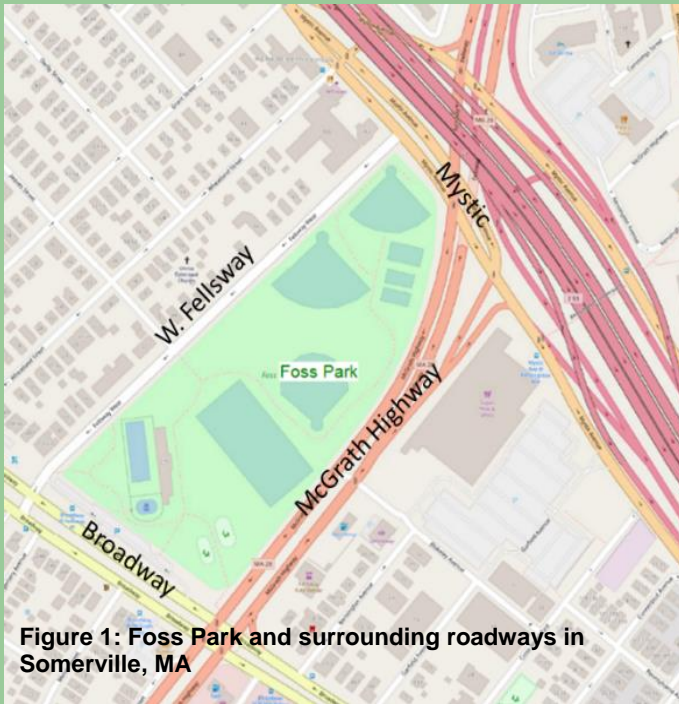


Figure 1: Foss Park and surrounding roadways in Somerville, MA

Background

Foss Park in East Somerville comprises approximately 8% of the City's open space, making it the second largest public park in Somerville.¹ The Park hosts amenities including a play structure for small children, tennis courts, baseball fields, a soccer field, and an outdoor swimming pool. It is heavily used by Somerville residents, in particular, youth and adult soccer and baseball teams. The Park is bordered by three highways and a major arterial street: Mystic Avenue (Rt 38) and Interstate 93 to the east, McGrath Highway (Rt 28) to the south, and Broadway Avenue to the west (Figure 1). Together, the three highways carry 230,000 vehicles per day through Somerville.



Figure 2: View of Foss Park from the intersection of Broadway Avenue and McGrath Highway



Figure 3: View of Foss Park children's playground from McGrath Highway

Air Pollution Near Roadways

The proximity of the park to busy roadways has raised concerns about exposure to traffic-related air pollution, which is associated with cardiovascular, respiratory, and neurological disease. Given these concerns, for the past decade, the Tufts Mobile Air Pollution Monitoring Lab has been used to measure air quality along roadways in Somerville including near Foss Park. Researchers have found that the concentrations of air pollutants created by the combustion of diesel and gasoline are elevated near highways and busy roadways in Somerville, like the roadways surrounding Foss Park.

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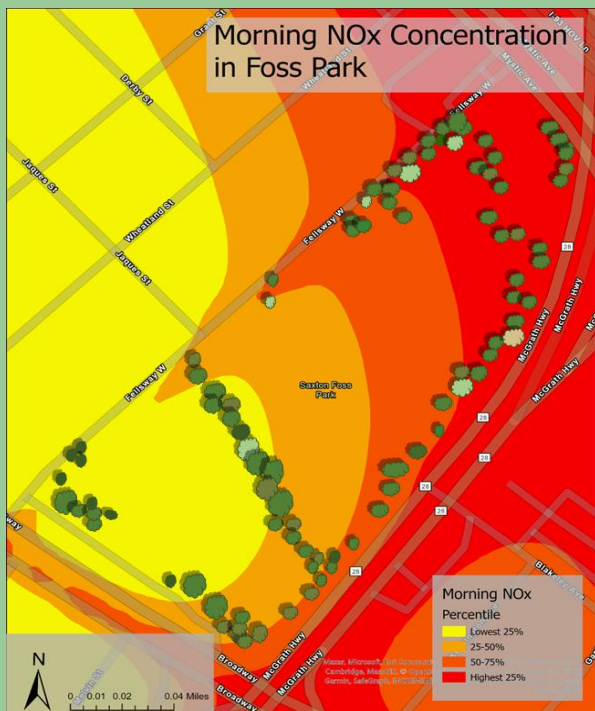


Figure 4: Modeled NOx concentration at Foss park on an average summer morning. Areas are colored by the intensity of concentration (i.e., area of the park that experiences the highest versus the lowest concentration).

Measuring Air Pollution near Foss Park

During busy traffic hours in the morning and evening, concentrations of ultrafine particles on roadways near Foss Park can be up to 10 times higher compared to when there is little traffic on the same roadways (for example, between midnight and 5 AM and during the pandemic-related lockdown period²).

Modelling Air Pollution near Foss Park

A dispersion model developed by the US Environmental Protection Agency for predicting pollution concentrations near busy roadways³ predicted short-term concentrations (one hour in summer) of NOx and elemental carbon at the northeast end of Foss Park (nearest to the intersection of Mystic and McGrath) that were 2-3 times higher when the winds blow the pollution downwind to the park from the highways compared to when no wind was present.

The measurement and modeling results suggest that depending on the time of day and weather conditions, recreational users of Foss Park are exposed to high concentrations of traffic-related air pollutants.

Air pollution mitigation strategies for Foss Park

The following strategies can mitigate air pollution exposure in the park:

1. The placement of playing fields and playgrounds closer to the West Fellsway side of the park where measurements consistently indicate lower concentrations than other sides of the park³.
2. The installation of a solid barrier or dense vegetation on the McGrath Highway and Mystic Avenue sides of the park.
3. Scheduling activities with vulnerable populations (young children, seniors, etc.) during light traffic periods.

These are just some of the potential mitigation strategies that can be used to improve the air quality and reduce exposures for users of Foss Park. Evaluation of strategies such as the construction of barriers should consider the impact of the elevated interstate highway near Foss Park as well as possible shadow effects at the open green space.

These findings may help to inform future plans to improve air quality and reduce exposures in Foss Park.

Credits: This work (measurements, modelling, report) was primarily authored by Tufts Air Pollution Lab (investigators Hudda and Durant, undergraduate GIS specialist Grace Anderson, and affiliate Greer Hamilton [also a doctoral candidate at Boston Univ. School of Social Work] who edited and curated the text). Anil Gurcan formatted the report. Photographs were taken by Wig Zamore.

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¹ <https://voice.somervillema.gov/fosspark>

² Reductions in traffic-related black carbon and ultrafine particle number concentrations in an urban neighborhood during the COVID-19 pandemic, N. Hudda, M C Simon, A P Patton, J L Durant, Science of the Total Environment (742), 14093, 2020 <https://www.sciencedirect.com/science/article/pii/S0048969720344600>

³ A near-road modeling system for community-scale assessments of traffic-related air pollution in the United States, Timothy M. Barzyk, Vlad Isakov, Saravanan Arunachalam, Akula Venkatram, Rich Cook, Brian Naess, Environmental Modelling & Software, 66, 2015.