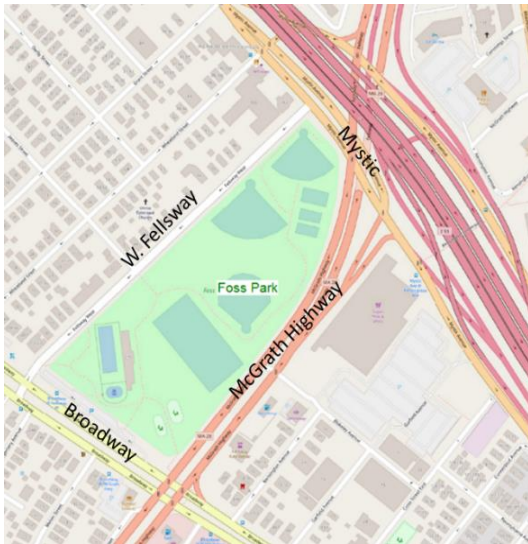


Foss Park: Air Quality Measurements at Foss Park, Somerville, MA



Foss Park in East Somerville comprises approximately 8% of the City's open space, making it the second largest public park in Somerville. The Park hosts public amenities such as a play structure for small children, tennis courts, baseball field, 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 city street. To the east of the park is Mystic Avenue and Interstate 93, to the south by Mystic Avenue and to the west by a major arterial (Broadway Avenue). The three highways together carry approximately 230,000 vehicles per day through Somerville.

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



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



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

Air Pollution Near Roadways and Adverse Health Effects

The proximity of the park to busy roadways has raised concerns about air pollution exposure. Exposure to traffic related air pollution is associated with cardiovascular, respiratory, and neurological disease. Given these concerns, for the past decade Tufts Mobile Air Pollution Monitoring Lab has been measuring air quality along roadways in Somerville. Researchers have found that the concentrations of air pollutants created by combustion of fossil-fuel (for example, diesel and gasoline) are elevated near highways and busy roadways in Somerville, like the roadways that surround Foss Park. Specifically, the concentrations of very small particulate pollutants including ultrafine particles and black carbon particles (soot) can be up 10 times higher near the highways. Gaseous pollutants such as oxides of nitrogen (NO_x) are also often as much as 2-3 times higher near the highways.

Foss Park: Air Quality Measurements at Foss Park, Somerville, MA

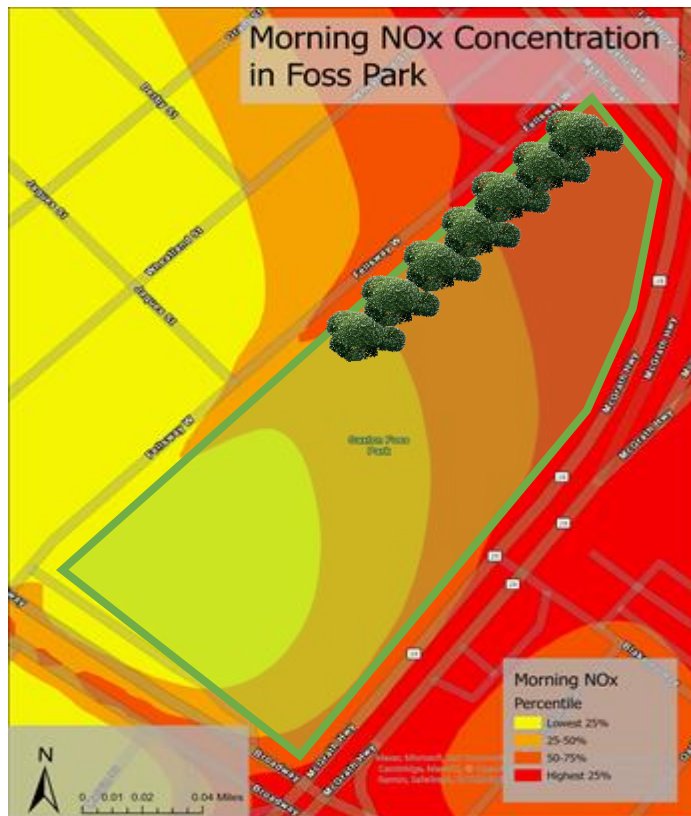


Figure 4: Modeled NOx concentration at Foss park on an average summer morning. Areas are colored by the intensity of concentration (i.e., area of the park that experiences the highest versus the lowest concentration).

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 Foss Park³.
2. The installation of a solid barrier or dense vegetation on the McGrath Highway & Mystic Avenue side of the park.
3. Scheduling activities with vulnerable populations (youth, 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 construction of a large, tall barriers should consider the impact of the elevated interstate highway near Foss Park as well as possible shadow effects at the open green space. Residents of Somerville and Foss Park users should take these findings into consideration as the findings from local and broader research offers solutions for air quality exposure mitigation.

¹ 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, Atmospheric Environment (742), 14093, 2020 <https://www.sciencedirect.com/science/article/pii/S0048969720344600>

² 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.

³ <https://voice.somervillema.gov/fosspark>

Measuring Air Pollution near Foss Park

During busy typical traffic hours concentrations of ultrafine particles on roadways near Foss Park can be up to 10 times higher compared to when there was little traffic on the same roadways (for example, during the pandemic-related lockdown period¹).

Modelling Air Pollution near Foss Park

A dispersion model developed by the US Environmental Protection Agency (EPA) for predicting pollution concentrations near busy roadways² 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.