CHAPTER 3

AIR

Air in the Parks
Ongoing Mitigations for Air Quality Impacts
Future Mitigations
Air Goals, Strategies, and Recommendations
AIR AND THE PARKS

“The motto of the Minneapolis Board of Park Commissioners adopted in 1883 was ‘Health and Beauty.’ ‘Health’ referred to parks providing fresh air — they would be the city’s lungs. ‘Beauty’ signified the board’s commitment to creating beautiful places in which citizens could escape from the city.” (City of Parks, p.27)

This motto still rings true with the MPRB vision 134 years later; what can be added is how much more we’ve learned about the “city’s lungs” in relation to the body around them. Air quality is a critical factor in how visitors experience the parks, as it impacts not only human health, but plant and animal health, and water quality, as well. Its scope is far bigger than park boundaries, having citywide and regional significance.

Poor air quality has ripple effects on water and life in the parks. As pointed out by the Minnesota Pollution Control Agency, “lakes and creeks can be harmed by air pollution that causes acid rain and fish can be affected by mercury that settles out of the air and into the water” (The Air We Breathe, MPCA 2017). This cycle is especially worrisome in urban areas, where air quality is poorer than in suburban and rural areas. Because of this, it is important to consider what can be done at the park level to address and mitigate pollutants in the air, especially as the Minnesota Pollution Control Agency points out that “today, most of our air pollution comes from smaller, widespread sources in our neighborhoods, [including] our vehicles, local businesses, heating and cooling, and yard and recreational equipment.” (The Air We Breathe, MPCA 2017).

With more than 160 parks in its care, MPRB is in a unique position to work on a neighborhood park scale to implement air quality improvement strategies. This chapter assesses the types and sources of air pollution in the Minneapolis park system, the effects of this pollution, and presents strategies to mitigate these impacts with a view of how MPRB can contribute to improving air quality as well as help to mitigate climate change in the City of Minneapolis.

AIR POLLUTION IN MINNEAPOLIS

Cities are often associated with poor air quality, given the concentration of human activities that produce air pollutants. Pollutants including particulates, ozone, volatile organic compounds (VOCs), and carbon dioxide (CO2) are found in the air in Minneapolis, though the overall air quality is better than many other major cities. Minneapolis’ air quality falls under Environmental Protection Agency thresholds for National Ambient Air Quality Standards (NAAQS) for all major air pollutants. This means Minneapolis is in “attainment” of the NAAQS standards. Still, it is important for MPRB to be mindful of these standards and sensitive to how they affect park spaces and park users.

The following table is a summary of information provided by the Environmental Protection Agency regarding air pollutant sources and their subsequent health effects. As the effects of bad air can be immediate and can cause serious, lasting damage to human, animal, and plant life, MPRB is committed to pursuing mitigation strategies in areas of the city that are closest to freeways and industrial uses, have the least public green space, and the most fragmented tree canopy.
### POLLUTANT | SOURCE | HEALTH EFFECT
--- | --- | ---
Particulates | Wood fires, construction, industrial uses, exhaust from automobiles and construction vehicles | Premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, increased respiratory symptoms (irritation of the airways, coughing or difficulty breathing)
Ozone | Ultraviolet light from the sun turns NOx and VOCs into ozone | Chest pain, coughing, shortness of breath, throat irritation. It may also worsen chronic respiratory diseases such as asthma as well as compromise the ability of the body to fight respiratory infections
Volatile Organic Compounds (VOCs) | Tailpipe emissions, smokestack emissions, residential heating system vapors | Eye, nose and throat irritation; headaches, loss of coordination and nausea; damage to liver, kidney and central nervous system; also one suspected cause of cancer
Carbon Dioxide (CO2) | Decomposition, respiration, burning of fossil fuels (coal, oil and natural gas) | Headaches, dizziness, restlessness, a tingling or pins or needles feeling, difficulty breathing, sweating, tiredness, increased heart rate, elevated blood pressure, coma, asphyxia, and convulsions
Nitrogen Dioxide | Burning of fossil fuels (coal, oil and natural gas) | Irritated airways, coughing, wheezing or difficulty breathing; may contribute to the development of asthma and potentially increase susceptibility to respiratory infections
Carbon Monoxide | Present whenever fuel (coal, oil, natural gas, wood, etc.) is burned | Reduced oxygen in bloodstream; concentrated amounts can lead to dizziness, confusion, unconsciousness and death
Sulfur Dioxide | Burning of fossil fuels (coal, oil and natural gas) at industrial facilities | Can harm the human respiratory system and make breathing difficult; damages foliage and decreases plant and tree growth

#### AIR QUALITY TESTING

Air quality testing is performed by the City of Minneapolis on an ongoing basis. The most recent citywide study was completed between November 2013 and August 2013, where air samples were collected on residential, commercial, park and city properties. Approximately 900 samples were collected by 100 collection canisters throughout the city. Each canister was analyzed for 61 volatile organic compounds (VOCs) over an acceptable health benchmark set by the Minnesota Department of Health. As a result of this testing, the study found 328 locations that fell above the acceptable benchmark for the following five VOCs: benzene, formaldehyde, naphthalene, tetrachloroethylene (known as perc), and trichloroethylene (TCE).

*Figure 15. Air Pollutant Sources and Health Effects*
Overall, the average results of the study show that air in Minneapolis is relatively good across the entire city. Hundreds of samples came back with few or no chemicals of concern. However, there were still sample results that had chemicals over health benchmarks. “Some of these results were expected, such as benzene and formaldehyde that come from transportation sources. There were also elevated levels of chemicals like tetrachloroethylene, primarily found in dry cleaning operations, observed in samples taken across the entire city. The Health Department will continue to provide incentives through the Green Business Cost Share Program to businesses that change to cleaner practices and reduce the pollutants found in this study. To date, this approach has led to the reduction of 21.39 tons of pollution annually by working with small businesses like dry cleaners, auto body shops, and larger manufacturers” (Air Quality: A New Neighborhood Approach, City of Minneapolis, 2015).

This study, as well as others that will follow it, builds MPRB’s awareness of a key environmental factor (the presence of VOCs in the air) that impacts the quality of natural spaces in the parks, the ability of plant and animal communities to thrive, and park visitors to enjoy their visit. However, it is also important for MPRB to take an inward look at its own operations and identify and mitigate, where possible, additional sources and types of air pollution that originate in the park system.

**SOURCES OF AIR POLLUTION IN THE PARKS**

Daily management of the park system requires a fleet of vehicles and equipment that keep park spaces clean, green, and safe. Yet this fleet can be a source of air pollution in the parks. Park visitors also impact air quality through their chosen mode of transportation and activities they engage in while in the parks. While it may come as a surprise, the buildings found in the park system have an impact on air quality as well, given the energy source used to provide them has a direct effect on outdoor air.

**FLEET**

MPRB has a diverse fleet of vehicles for maintenance and Park Police to meet park care and safety requirements year round. Because vehicular use is a primary source of carbon dioxide emissions in and around the parks, it is important to consider their use in maintaining and protecting park spaces. Considering the marketplace for vehicles has extremely limited options for fuel efficient trucks and other large vehicles made to haul heavy loads (though better efficiency vehicles should be purchased to replace existing fleet vehicles when at the end of their useful life), the next best alternative is to reduce frequency of use when possible.

The opportunity for trip reduction often depends on the spatial relationship between sites where trips originate and the sites that have to be maintained in a certain timeframe. To this end, both the City of Minneapolis and MPRB have begun tracking vehicle utilization, including frequency of use, miles traveled, gas efficiency, and time spent idling, to assess fleet performance and determine whether there might be alternatives such as smaller, more efficient trucks, that can be used as larger equipment is phased out of the fleet, approximately every eight to ten years.
Where MPRB’s recreational programming leads to trip generation and vehicle emissions, there is also an opportunity to think about alternative transportation types or activities that would result in lower emissions. MPRB will continue to explore hybrid, electric, and increasingly gas efficient vehicles for its fleet operations; it will also consider how to manage trips from current bases of operation to reduce miles traveled, when possible.

**STREET SWEEPERS**
As MPRB looks into diversifying its fleet, it would be useful to explore how incorporating different types of vehicles like street sweepers could be of benefit to water, air and land. Used to clean surface pollutants off impermeable surfaces, street sweepers can prevent further pollution of natural areas. The timing of their use is key. When street and parking lot sweeping happens right after snow melt or in advance of a big storm, it is considered a best management practice to protect water from salt and other substances on the roads. The challenge for MPRB is that because there is no vehicle currently in its fleet to achieve this work, the parks are often last in the city’s scheduled service. Consequently, street sweeping often happens too late in the park system, thus missing the opportunity to protect water, air, and land from surface pollutants.

Because street sweepers are notoriously slow moving and historically inefficient regarding gas consumption, it is critical to seek out higher performing hybrid vehicles. Further, vacuum mounted street sweepers reduce the number of particulates churned into the atmosphere as the sweeper completes its work and help to maintain permeable paver surfaces much more effectively than traditional street sweepers. Thus, as MPRB explores its capacity to acquire its own street sweeping equipment, fuel efficiency and vacuum mounted equipment should be strongly considered.

**GROUNDS EQUIPMENT**
As with its fleet, MPRB’s grounds equipment varies in size as best fits the task it has been selected to perform. Mowers, trimmers, weed whips, and blowers are all utilized to care for park. Currently, there is a need for a standardized procedure that outlines the where, when, and how often each one of these machines should be used. Thus, MPRB is in process of developing a natural areas management plan that articulates this procedure. Following its development, a comprehensive vegetation management plan should be created. Corresponding training should be offered to all park keeping staff to ensure consistency is achieved throughout the system and all vegetation is kept as best fits its growth rate and the aesthetic standard expected by the community. Additionally, this plan should address best practices for noise mitigation, given noise is another impact frequently experienced when grounds equipment is used.

**VISITORS**
The visits to regional parks are sampled on an annual basis in order to produce an estimate of annual visitor counts. Because visitors are counted based on their mode of access (car, bus, bike, or pedestrian) and pay-for-parking utilization is also tracked, MPRB has some baseline information on regional park user access. (This tracking is not yet done on a neighborhood level.) Despite comprehensive park access data being unavailable, access by car seems to be the leading trend in the regional parks sampled.

A 2016 Regional Parks and Trails Visitor Survey commissioned by the Metropolitan Council showed that over half of MPRB park visitors accessed regional parks and trails by car, where only 2% accessed them via transit. Completing a comprehensive park access study would enable MPRB to tell a story not only about the environmental implications of access, but also the equity implications. Those parks that are easier or more desirable to reach by...
car than by any other mode present an air quality problem as well as an equity barrier to potential visitors who do not have a car. Encouraging modal shift away from the personal automobile to bike, pedestrian, and transit-based access would help to ensure continual air quality improvement within the parks and would also build a case for improved and increased regional trail infrastructure, transit service near the parks, and local infrastructure improvements (roads, sidewalks, trails, pathways, and so on) that connect neighborhoods with park access points. Achieving this shift would require increased coordination between MPRB, the City of Minneapolis Public Works, and Metro Transit, to comprehensively address park access and interjurisdictional responsibility for the infrastructure and level of service that park users need.

FIRES
It is difficult to say whether fires are a significant or consistent cause of air pollution in the park system, as they are only allowed for culinary purposes and therefore not consistently tracked. However, wood fires are a source of increased air pollution including particulates, benzene, formaldehyde, acrolein, and polycyclic aromatic hydrocarbons (PAHs), while charcoal fires produce carbon monoxide. Many park visitors are concerned about the known corresponding health implications of all of these air pollutants. The Environmental Protection Agency states, “Short-term exposures to particle pollution from wood smoke have been linked to a variety of health effects. Short-term exposures to particles (hours or days) can aggravate lung disease, causing asthma attacks and acute bronchitis, and may also increase susceptibility to respiratory infections.”

While MPRB has an ordinance prohibiting fires within park spaces except for culinary purposes (PB2-20) as well as a policy prohibiting smoking in the parks and on parkways, it issues occasional permits for fires to be held at special events. There is currently no restriction on how culinary fires are built (with wood chips versus charcoal, though there is a restriction, per a City of Minneapolis rule that any wood used for recreational fires must be untreated by paint or chemicals) or on how many permits are issued annually for special event fires. MPRB is willing to explore the air and health impacts of different fuel sources as well as track the number of annual permits it issues to determine whether further restrictions should be put into place.

BUILDINGS — ENERGY SOURCE AND AIR QUALITY
While park buildings are not inherently air polluters, the energy required to power the buildings can be a source of air pollution depending on the type of energy required. Buildings powered by solar energy or geothermal rather than gas and electric sources burn less fossil fuel, which translates to less air pollution and better air quality in the park system. Thus, MPRB is exploring site suitability within the park system to understand which locations are best suited to solar and geothermal energy systems. This will help to direct future capital improvement projects, including the updating and potential retrofitting of facilities to include alternate energy sources. This goal will allow MPRB to be consistent with the City of Minneapolis pledge to achieve 100 percent renewable electricity for municipal facilities and operations by 2022 and citywide by 2030. To date, MPRB has placed eight photovoltaic solar power installations within the park system.
Ongoing Mitigations for Air Quality Impacts

MPRB has a number of mitigation strategies already underway to help reduce air quality impacts that result from park operations. For instance:

**VEHICLE EMISSIONS**
Because vehicle emissions are the leading cause of particulates, CO2, VOCs, and CO in the City of Minneapolis, MPRB is working to identify Green Fleet Goals that are consistent with the City of Minneapolis’ program that offers a discounted transit pass for staff.

**PRESCRIBED PRAIRIE BURNS**
MPRB prohibits burning during high MPCA air quality alert days and provides public notification of planned burns, such that hospitals, schools, care facilities, and air-sensitive populations may be better aware of and prepared for these events.

**NATURAL RESOURCE/ENERGY CONSUMPTION**
MPRB recognizes that natural resource consumption is an ongoing challenge at its buildings and has started to evaluate building energy consumption and cost, as well as age and efficiency of HVAC systems. In the interest of reducing its natural resource consumption, MPRB has completed a study of solar suitability at over fifty sites and has increased the use of solar energy at six parks, to help reduce the reliance on fossil fuels to power buildings, and provide solar energy education opportunities.

**URBAN HEAT ISLAND EFFECT AND TREE CANOPY FRAGMENTATION**
Urban heat island effect hits plant life in the parks especially hard. Since it is difficult for plant life to adapt to heat, even a few degrees can make a difference in their survival. As such, prairie restoration and tree canopy preservation projects are in effect throughout the park system to help improve the park system’s ability to combat these impairments. Additionally, pervious paver projects have been piloted to determine efficacy and ease of maintenance of these materials as an alternate to impervious parking spaces, which tend to retain heat longer than pervious pavers.

With the help of a tree preservation specialist on staff, tree planting plans with a 10% genera limit have been developed to encourage species diversity and to help maintain the largest possible trees in available growing space. MPRB is also expanding public education to address protecting tree canopy throughout the city beyond park boundaries, which includes a particular emphasis on the need to water trees that line streets and boulevards in front of owned and rental housing.
Future Mitigations

MPRB is in the process of setting up a new asset management software that will enable more thorough tracking and benchmarking to take place and to get a sense of potential future air quality mitigation strategies. In the meantime, MPRB can learn about opportunities for future mitigation based on mapping of the parks current conditions (see Fig. 20 and Fig. 21).

CARBON SEQUESTRATION: PROTECT AND ENHANCE AREAS

Currently, MPRB has data reflecting tree canopy, urban heat island, air quality testing results, land cover types, and impervious surfaces. This data provides a picture of mitigation opportunities within the parks, but solutions are complex. It is not enough to say that all those areas without tree canopy should simply be filled with more trees or areas covered by impervious surfaces should be reduced. Rather, these opportunities should be examined in relation to other land covers to understand where best management practices might be put into place to affect the most change, while still maintaining the community’s vision for their parks. By identifying which areas within the park system are best suited to protection, enhancement, and restoration based on existing land covers, mow frequency, and the potential need for soil improvement, MPRB will be better equipped to consider future projects. This information should be used in collaboration with other considerations within this plan related to water, habitat, and general park use to determine the best possible locations.

![Figure 18. Carbon Sequestration Protect and Enhance Areas map. See appendix for full size map.](image)

![Figure 19. Carbon Sequestration Effectiveness within Enhancement Areas map. See appendix for full size map.](image)
**INCREASED ENERGY EFFICIENCY**

While solar and geothermal systems are currently very expensive and typically offset a limited portion of a recreation building’s total energy requirement, their use is a start at increased energy efficiency. As these systems continue to evolve and grow in offset capacity, knowing the conditions on park land that are most suited to solar and geothermal systems will help MPRB revisit the question about how and where to incorporate them in the future.

Figure 20. MPRB Buildings with Good Solar Potential. See appendix for full size map.

Figure 21. Sustainable Energy—Geothermal Opportunity Area map. See appendix for full size map.
Air Goals, Strategies, and Recommendations

It’s important to look at both short term and long term mitigation measures for air quality concerns, as air quality is not only an environmental issue, but also an equity issue. MPCA’s 2017 report, “The Air We Breathe,” states “Many studies in Minnesota and around the world are trying to better understand the relationships between pollution, social conditions, and health outcomes. Some (...) indicate people of lower socio-economic status and people of color are more vulnerable to adverse health effects from exposure to air pollution. Other studies, including work by the MPCA and University of Minnesota, indicate people of color and lower-income communities are also exposed to higher levels of air pollution than those in predominantly white and higher-income areas. Historically, there have been more pollution sources, including busy roadways, located in lower-income neighborhoods and communities of color. Residents of these same neighborhoods also tend to have less access to clean and safe parks for recreation, healthy food, regular health care, and other conditions that support a healthy life.”

Recommendations come in a few broad categories, including policy, procedure, partnerships, park access, and goal setting.

With these findings in mind, MPRB will continue to seek out opportunities to incorporate green and natural spaces throughout Minneapolis and incorporate equity questions throughout its planning, design, and engagement processes. With current and future data in hand, MPRB will be prepared to share air quality findings with the community and work together to prioritize projects that will help achieve mitigation strategies and goals.

Existing mitigation efforts are a strong start to address air quality concerns within the City of Minneapolis, but MPRB recognizes a need to identify goals and strategies that will incorporate other best management practices beyond existing mitigation measures. The above table includes goals and strategies that will help MPRB contribute to the improvement of air quality and urban heat island in the City of Minneapolis.

As shown above, there are several impactful strategies MPRB can pursue to help meet goals related to improved air quality and climate change mitigation.

POLICY

Policy is an important vehicle for changes in air quality. For instance, the City of Minneapolis has taken a proactive step in the introduction of an anti-idling ordinance that “restricts idling of cars and other gas or diesel powered vehicles to no more than three minutes in a one hour period”. While there are exceptions to this rule, based on need to idle (such as extreme weather), its intent is focused on reducing emissions, as “in general, 10 seconds of idling uses more fuel than restarting a car.”

While developing policy is typically a lengthy, detailed process, it is important for MPRB to explore what it can do on the policy level to ensure consistency across the organization in meeting ecologically driven planning and operational goals. Future goals might include:

- Development of a green building policy with LEED goals for all new buildings and building retrofits
- Development of a green bidding policy that requires all contractors bidding on construction projects to present alternatives with sustainable and/or recyclable materials
- Development of a materials disposal policy that centers on reduction of waste and recycling or reuse of materials where possible
- Development of a planting policy that guides the type and concentration of plant species that may be utilized in neighborhood and regional parks
Development of a purchasing policy that requires all equipment purchases to include the exploration of more fuel and energy efficient equipment

PROCEDURE

As policy changes correspond to subsequent changes in procedure, procedures pertaining to land management, purchasing, and construction are important to explore. Where appropriate, shifting turf landscape to natural space will have a significant impact on air quality, through eliminating mower emissions. Similarly, purchasing vehicles and equipment that meet reliability expectations while being more environmentally friendly, is a strategy MPRB intends to pursue. However, even when done, this strategy needs to be coupled with potential expansion and/or relocation of MPRB asset management and forestry facilities to result in fewer, more efficient trips. Currently, the travel between facilities and project sites within the parks often results in multiple, lengthy trips. While better fuel performance would be a positive step forward, it is also important to consider the trips that are required to complete the work. Additionally, reviewing and, if needed, changing construction specifications and requirements to be more eco-friendly, offering pre-bid contractor discussions to raise awareness about environmental performance expectations, and providing spot inspections of park-based construction projects to ensure consistency with specifications are all important changes in the planning and implementation process for current and future MPRB projects.

Another procedural strategy to improve air quality includes protecting and, where possible, increasing the number of natural elements that act as carbon sinks (places where more carbon is absorbed than carbon dioxide is produced) through planting.

- TREES are known for their carbon sequestering abilities, but even with 600,000 trees under its care, MPRB doesn’t have nearly the number of trees that are found in private backyards throughout the city. Thus, raising awareness that maintaining healthy trees and a connected tree canopy translates to better air is an important step in preserving and improving on both the canopy found in the parks and in the surrounding neighborhoods. The key is maintenance. While MPRB will continue to prune, plant, water, remove, and replace trees where it can, residents in Minneapolis can help this effort by watering street trees in front of their homes, whether rented or owned.

- PRAIRIES are also known to act as carbon sinks and are faster to grow than tree stands. Additionally, prairies require less water and maintenance, act as natural erosion controls, and promote biodiversity among both plants and animals. Where natural areas are preferred to mowed turf, restored prairies are a great fit and can be installed on varying scales stemming from small pollinator patches to fields.

- BIOCHAR, a charcoal made from plant matter, can be planted into the ground as one very cost-effective method of sequestering carbon. Because of its ability to simultaneously hold carbon and boost soil nutrients, biochar should be explored for its potential to help the parks, especially where vegetation is most limited. Placing biochar under or around athletic fields, in gardens, and under bare dirt presents a strong opportunity to sequester carbon where trees or prairies are not present.

STRATEGIC PARTNERSHIPS

Strategic partnerships also offer the opportunity to address air quality issues that span citywide. Working with other local agencies and organizations to increase transit offerings to parks, improve and expand bike and pedestrian connections between park spaces, create green spaces and gardens in areas currently without these amenities, are all strategies consistent with MPRB seeking to fulfill its role as the “greening agency” of the city.

While air quality is not tracked on the park level, MPRB is committed to partnering with the City of Minneapolis and the Minnesota Pollution Control Agency to further their air quality testing and to better understand what mitigation efforts might be successfully deployed on the park level. Because MPRB works with the City of Minneapolis to procure vehicles for its fleet, it is important to also work on its consistency with the city’s Green Fleets Policy, which “sets guidelines to minimize greenhouse-gas (GHG) emissions of current and future fleet vehicles.”

One of the strongest opportunities to do this, according to City staff, is to begin looking at transitioning the fleet to electric vehicles and expanding the availability of charging stations in the park system.

Recognizing that cars and trucks are the single largest source of air pollution in Minneapolis, MPRB will also promote alternate means of accessing and enjoying the parks. As stated in “Life and breath,” a 2015 report published by the Minnesota Department of Health, in partnership with the Minnesota Pollution Control Agency, “actions such as driving less, walking and biking more, and minimizing recreational fires help reduce air pollution in Minnesota communities.” As such, MPRB will continue its work with Metro Transit to determine how existing levels of service translate to park accessibility and what impact proposed routes might have on park access.

PARK ACCESS

MPRB conducts annual summer counts of regional park visits to get an estimate of visits within the regional park system. However, it does not yet have a holistic sense of how the majority of neighborhood park visitors access parks or whether the availability of transit options is an attraction (in the case of readily available options) or deterrent (in the case of limited options) to park visits. This is an important piece of the access puzzle that MPRB will need to continue researching in partnership with local transit authorities, but in the meantime, the leading observation about park access is that individual cars are the primary sources of transportation to regional parks. Park access by car will likely be a trend for some time to come, yet MPRB can certainly advocate for transit offerings that promote better park access (more frequent headways on weekends, transit stops near accessible entry points, regional transit service to parks) as well as continuing to plan for bicycle and pedestrian connections between parks, neighborhoods, regional trails, and transit services in coordination with local and regional agencies.

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GOAL SETTING

Finally, goal setting will allow MPRB to track its operations against measurable outcomes and determine what progress is being made toward better air quality in the parks. For instance, these goals can address such things as:

- Equipment purchasing changes
- Mow frequency, height, and gas use
- Utilization of electric vehicle charging stations (MPRB already has three electric fleet vehicles and charging stations at four locations within the park system, but there is the opportunity to do much more)
- Vegetation management plan to address all park vegetation
- Use of iTree data to better understand carbon sequestration impact in parks and to help inform planting plans

As MPRB seeks to meet goals related to policy, procedure, strategic partnerships, park access, and tracking, it will be in the position to better identify opportunities for strategic shifts in planning and operations.

MPRB will also now be tasked with assessing air quality impacts from proposed maintenance, rehabilitation, restoration, planning, design and construction work in each of its future projects, per the recommendations outlined in the table below. These recommendations have been developed to chart next steps for MPRB as it works toward environmental goals shared earlier in this chapter, with the awareness of particular air impacts that are of concern within the park system and strategies and best management practices that are already in effect in park planning, operations, and maintenance.

### C. AIR: CONTRIBUTE TO IMPROVING LOCAL AIR QUALITY AND REDUCING URBAN HEAT ISLAND

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<tr>
<th>Goal</th>
<th>Strategy</th>
<th>Recommendation</th>
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<tr>
<td>10. Partner in regional heat island and air quality monitoring and studies</td>
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<td>11. Focus tree planting in areas identified as having high heat island or low air quality</td>
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<td>12. Reduce vehicle and equipment emissions</td>
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<td>12.1. Examine fleet-wide emissions and estimate emissions generated by park employees, then set reduction goals</td>
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<td>12.2. Document and communicate options for hybrid and electric vehicles for all vehicle purchases</td>
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<td>12.3. Develop small equipment inventory that includes emissions information, then work to transition small equipment fleet to alternative options, such as electric or four-stroke</td>
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<td>12.4. Adopt Green Fleet procedures similar to City of Minneapolis fleet procedures, including flex fuel protocols and idling standards</td>
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<td>12.5. Complete service centers master plan with consideration of siting to achieve more efficient travel management</td>
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<td>12.6. Develop transportation management plan and procedures for field staff that considers and optimizes travel time to and between parks and service centers, in order to reduce overall vehicle miles and emissions</td>
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<tr>
<td>13. Use low-VOC or no-VOC materials (paints, glues, cleaning supplies, etc.) in buildings and in maintenance activities wherever possible</td>
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<td>14. Ensure maintenance of landscapes with fire does not coincide with air quality alert days</td>
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<td>15. Monitor air quality at wood processing facility</td>
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D. AIR: CONTRIBUTE TO CLIMATE CHANGE MITIGATION

16. Reduce the agency-wide carbon footprint

16.1. Complete a carbon footprint analysis, including identification of areas of improvement and reduction strategies
16.2. Establish carbon footprint reduction targets and tasks and report at least annually on progress
16.3. Explore alternative energy purchasing programs, to increase percentage of MPRB energy that is generated sustainably

17. Advocate for and support carbon footprint reduction for park employees and visitors

17.1. Promote transportation mode changes for MPRB staff and park visitors, including remote work options, shared EV pool vehicles, bicycles, scooters, and transit
17.2. Improve information technology to allow for more effective remote meetings
17.3. Work with MetroTransit to evaluate and improve transit access to parks
17.4. Improve park access points for multi-modal users, including ensuring curb ramps are properly placed and designed

18. Increase building efficiency

18.1. Complete agency-wide energy audit and identify areas of improvement
18.2. Design efficiency into buildings at time of construction or major improvements
18.3. Perform energy efficiency improvements as part of general building and grounds maintenance, including door and window sealing, HVAC improvements, lighting improvements, enhanced insulation, and others

19. Explore alternative energy generation opportunities in parks

19.1. Explore geothermal and solar generation in areas determined suitable for those energy sources, when improving or constructing buildings or other site improvements
19.2. Seek grants for additional solar and/or geothermal installations

20. Sequester carbon in the park system and urban forest

20.1. Study the ability and potential of parkland and urban forest to sequester carbon, and identify areas of improvement through landscape change (in partnership with natural areas management), and other practices
20.2. Explore use of biochar under athletic fields and in soil modification projects