



Date: January 10, 2017

To: Patrick H. West, City Manager *P.H.W.*

From: Kelly Colopy, Director of Health and Human Services *KC*

For: Mayor and Members of the City Council

**Subject: Report and Recommendations on Leaf Blowers**

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On May 10, 2016, the City Council requested the Board of Health and Human Services (Board) to produce a detailed report, within six months, on any past discussions, memorandums, codes, ordinances, and/or regulations on leaf blowers. The Board was requested to provide input on any studies or documented health and safety impacts that have been identified by researchers, and to provide any data available on complaints and potential impacts. Finally, the City Council requested the Board to include recommendations that it could consider on this matter as a next step.

In response to the City Council request, the Board formed a Subcommittee to study the issue. The Subcommittee worked closely with the Health and Human Services Department's Bureau of Environmental Health and environmental consultants, Mearns Consulting, LLC, to coordinate the attached report.

The following key areas are addressed in the report:

- Potential hazards
- Regulatory approaches in other jurisdictions
- Detailed overview of Santa Monica's leaf blower ordinance
- Cost impacts of banning leaf blowers on gardeners and landscape companies
- Practicable considerations for leaf blower use
- Alternatives for City Council consideration, including:
  1. A complete ban of all motorized leaf blowers (including electric).
  2. A ban on gasoline-powered leaf blowers (only allowing electric, i.e., zero emissions models).
  3. A requirement that gasoline-powered leaf blowers be model year 2007 or newer (meeting current emissions standards) and operating at 65 dBA or less.
  4. Education - informing and educating the public regarding leaf blower hazards and alternatives.

**Board of Health Recommendations:**

The Board recommends alternative three – require all gasoline-powered leaf blowers, for commercial or residential use, to be model year 2007 or newer and produce 65 dBA of noise or less. This alternative would comply with current exhaust and noise standards. Dust emissions would be generated; however, the dust emissions would be in compliance with current California Air Resources Board (CARB) standards. This alternative would be used in conjunction with the existing leaf blower exchange program offered by the South Coast Air Quality Management District (SCAQMD). Retail costs on new model leaf blowers are currently between \$300 and \$475. SCAQMD exchange programs offer new model leaf blowers at \$200 per unit. In addition to residential users, this requirement would impact approximately 350 licensed landscape and garden businesses in the city of Long Beach.

A public education and outreach approach would be developed by the Health and Human Services Department to educate operators, regulators and the public on health and safety issues associated with leaf blowers. Compliance with the requirement for newer model leaf blowers would be administered and enforced as a condition of the business license, while residential adherence could be addressed on a complaint-driven basis.

The Board also recommends:

1. Consideration of regulations that urge users of leaf blowers to comply with the manufacturer's personal protective equipment and use recommendations;
2. Education of operators, regulators and the public about leaf blower safety and health impact issues;
3. Further evaluation of the health effects, particularly on operators, and air pollution impacts due to the use of leaf blowers; and,
4. Review of emerging leaf blower technology in five years to determine additional practical alternatives to gas-powered leaf blowers.

Should you have any questions, please contact me at (562) 570-4016 or Nelson Kerr, Environmental Health Bureau Manager, at (562) 570-4170.

**ATTACHMENT**

CC: CHARLES PARKIN, CITY ATTORNEY  
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CITY CLERK (REF. FILE #16-0407)

# Qualitative Risk Assessment on Leaf Blowers

## **Background**

The Long Beach City Council on May 10, 2016 made a request to the Board of Health and Human Services to produce a detailed report within six months on any past discussions, memorandums, codes, ordinances, and/or regulations on leaf blowers. City Council also requested the Board provide information for consideration regarding any studies or documented health and safety impacts that have been identified by researchers on the potential hazards from the use of leaf blowers.

The leaf blower became an accepted gardening/landscape maintenance tool in California during the drought in the 1970s as the use of water for many garden cleanup tasks was prohibited (CARB 2000, [http://grounds-mag.com/mag/grounds\\_maintenance\\_blown/](http://grounds-mag.com/mag/grounds_maintenance_blown/)). There are four types of leaf blowers (1) 2-cycle gasoline/oil engine, (2) 4-cycle gasoline engine, (3) corded electric and (4) cordless electric.

The issues usually mentioned by those who object to leaf blowers are health impacts from noise, air pollution, and dust. Municipalities regulate leaf blowers most often as public nuisances in response to citizen complaints (CARB 2000).

## **City of Long Beach Restrictions on Leaf Blowers**

In the City of Long Beach, leaf blowers are regulated through the City's Noise Ordinance (LBMC Ch. 8.80.200 M 3). The ordinance restricts the times leaf blowers are permitted to operate – Monday thru Friday from 8am to 8pm; Saturday from 9am to 5pm and Sunday from 11am to 5pm. These time restrictions only apply when leaf blowers are used in residential areas or within 400 feet of a residential area. The Health Department's Bureau of Environmental Health is responsible for enforcing the Noise Ordinance.

The average number of complaints received by the Noise Office over the last four years is 8.25 per year. However, more complaints were received in 2016 than in past years. Complaints received regarding leaf blowers over the last four years were as follows: 2013 (2), 2014 (7), 2015 (7) and 2016 (17). No additional complaints have been received in the last 30 days. Most complaints are regarding noise or operating the leaf blower prior to the allowable timeframes per municipal code.

## **Potential Hazards**

The California Air Resources Board (CARB) 2000 study *A Report to the California Legislature on the Potential Health and Environmental Impacts of Leaf Blowers* identifies three potential hazards from the use of leaf blowers, exhaust emissions, dust emissions and noise as discussed below.

### ***Exhaust Emissions***

Exhaust emissions from gasoline-powered leaf blowers consist of hydrocarbons from burned and unburned fuel which combine with other gases in the atmosphere to form ozone, carbon monoxide, fine particulate matter (PM) and other air contaminants in the unburned fuel including but not limited to benzene, 1,3-butadiene, acetaldehyde and formaldehyde (CARB 2000).

CARB introduced Tier I standards in 1990 limiting the levels of exhaust that a gasoline-powered, non-road engine could produce. The regulations reduced the combined limit of ozone-depleting hydrocarbons (HC) and oxides of nitrogen (NO<sub>x</sub>) to 180 grams per brake horsepower hour (g/bhp-hr).

The federal Clean Air Act in 1990 gave the USEPA authority to enforce non-road emission standards. The EPA's Phase 1 called for a reduction similar to CARB's to take effect nationwide by 1997 for most engines.

CARB introduced Tier II standards in 2000. The new regulations reduced the emission limit to 54 HC and NO<sub>x</sub> (combined) g/bhp-hr. The USEPA's Phase 2 standards reduced the emission limit to 37 HC and NO<sub>x</sub> (combined) g/bhp-hr for most small engines utilizing a phased approach that included allowable levels of exhaust to be decreased each year between 2002 and 2007 ([http://grounds-mag.com/mag/grounds\\_maintenance\\_blown/](http://grounds-mag.com/mag/grounds_maintenance_blown/)).

Manufacturers have developed several different methods to comply with the standards and have done an acceptable job certifying and producing engines that are below the regulated limits. Electric-powered models that are exhaust-free are also available.

The South Coast Air Quality Management District (SCAQMD) sponsors an annual Leaf Blower Exchange Program. Commercial landscapers and gardeners operating within the South Coast Air Basin can exchange old, high-emission, noisy backpack leaf blowers for new low-emission/low-noise backpack leaf blowers available at a discounted price.

According to information posted on the SCAQMD's website 12,000 old leaf blowers have been replaced since 2006 reducing 138,729 pounds of hydrocarbon and NO<sub>x</sub> emissions and 88,282 pounds of smog-forming pollutants per year. (<http://www.aqmd.gov/home/programs/community/community-detail?title=lawn-equipment#leaf%20blower>).

**Findings** - There are gasoline-powered leaf blowers currently available that meet the USEPA and CARB thresholds for exhaust emissions and operate at or below 65 decibels.

### ***Dust Emissions***

Data on fugitive dust indicate that total suspended particulate matter (TSP), PM<sub>2.5</sub> and PM<sub>10</sub> emission impacts from dust suspended by leaf blowers are low and dissipate within 6 minutes after use (CARB 2000, Fitz, D., et al. 2006).

Emission rates for leaf blowers were quantitatively measured by the College of Engineering-Center for Environmental Research and Technology, University of Riverside in a study conducted in 2006 (Fitz, D., et al. 2006). The study was designed to determine emissions from leaf blowing/vacuuming, raking and sweeping on asphalt and cement substrates. Movable chambers either 10meters (m) or 20m in length, 2m wide and 2m high were constructed of 1-inch PVC pipe with aluminum modular pipe and rail fittings covered by polyethylene tarps held fast to the ground surface with sand bags. Material collected from areas that were to be leaf blown or swept was placed inside the chambers on either asphalt or concrete substrates. Thermo Systems Inc. Model 8520 DustTrak Aerosol Monitors (DustTrak) were used to measure TSP, PM<sub>2.5</sub> and PM<sub>10</sub> when the material was either leaf blown, swept or raked (Fitz, D., et al. 2006).

The greatest concentrations of TSP generated by a leaf blower measured in a 20m long chamber by a DustTrak placed 0.5m high at 16m into the chamber was 13.5milligrams per cubic meter (mg/m<sup>3</sup>). The greatest concentrations of PM<sub>2.5</sub> in a 20m long chamber by a DustTrak placed 1m high at 6m was 3.9mg/m<sup>3</sup>. The greatest concentrations of PM<sub>10</sub> in a 20m long chamber by a DustTrak placed 2m high at 16m was 25.7 mg/m<sup>3</sup> (Fitz, D., et al. 2006). These measured concentrations are less than their corresponding CARB PM thresholds.

The CARB threshold for PM<sub>2.5</sub> is 12micrograms per cubic meter (µg/m<sup>3</sup>) as an annual average. The CARB threshold for PM<sub>10</sub> is 50µg/m<sup>3</sup> 24hour average and 20µg/m<sup>3</sup> annual average (<https://www.arb.ca.gov/research/aaqs/pm/pm.htm>).

The College of Engineering-Center for Environmental Research and Technology, University of Riverside study concluded (1) there was little difference between generation of PM between leaf blowers or leaf vacuuming, (2) sweeping with a broom on concrete created significant PM emissions, (3) sweeping on asphalt did not and (4) raking leaves did not generate significant PM emissions (Fitz, D., et al. 2006).

**Findings** - A quantitative study of dust emissions indicates suspended particulate matter created by leaf blowers is less than CARB thresholds.

### **Noise**

Noise is defined as a loud or unpleasant sound (<http://www.merriam-webster.com/dictionary/noise>). USEPA defines noise as an unwanted or disturbing sound. The persistent and escalating sources of sound can often be considered an annoyance.

The Occupational Safety and Health Administration (OSHA) has published permissible exposure limits (PELs) for noise (29CFR 1910.95(a)).

<b>Duration per day, hours</b>	<b>Sound level dBA, slow response</b>
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or less	115

Additionally OSHA and Cal OSHA set an 8-hour time weighted average (TWA) for 85 decibels measured on the A scale, slow response for workers (29CFR 1910.95(c)(2); Title 8 §5095).

Early leaf blowers averaged about 78 decibels, with some machines measuring even louder. The League for the Hard of Hearing reports that noise levels above 85 decibels can harm hearing over time. Many new blowers are at or below 65 decibels (a conversation is typically around 60 decibels). For every six decibel reduction, sound intensity is actually reduced by 50 percent. That means many of today's units are four times quieter than older blowers. Typically, 67 to 69 decibels, when measured from a distance of 50 feet, is considered an acceptable noise level in most U.S cities and municipalities ([http://grounds-mag.com/mag/grounds\\_maintenance\\_blown/](http://grounds-mag.com/mag/grounds_maintenance_blown/)).

**Findings** - There are gasoline-powered leaf blowers currently available that meet the USEPA and CARB thresholds for exhaust emissions and operate at or below 65 decibels. Electric leaf blowers have no exhaust and are much quieter than gasoline-powered leaf blowers.

### **Banning or Limiting the Use of Leaf Blowers**

Soon after the leaf blower was introduced into the U.S., its use was banned as a noise nuisance in two California cities, Carmel-by-the-Sea in 1975 and Beverly Hills in 1978. By 1990 the number of California cities that had banned the use of leaf blowers was up to five; Berkeley banned the use of gasoline-powered leaf blowers in 1990. By 2000 20 California cities banned leaf blowers sometimes only within residential neighborhoods and usually targeting gasoline-powered equipment; another 80 cities have ordinances on the books restricting either usage or noise level or both. Other cities have considered and rejected leaf blower bans (CARB 2000).

Many U.S. towns and counties now regulate leaf-blower noise. Some locales simply restrict blower use to certain times of the day or year; others ban gasoline-powered leaf blowers while allowing only electric blowers. More than a dozen communities, mostly in California, have banned all gas and electric leaf blowers. The list of leaf-blower regulations in the table below is from the [Noise Pollution Clearinghouse](http://www.consumerreports.org/cro/magazine-archive/2010/september/home-garden/leaf-blower/blower-noise/index.htm), a nonprofit organization based in Montpelier, Vt. (<http://www.consumerreports.org/cro/magazine-archive/2010/september/home-garden/leaf-blower/blower-noise/index.htm>).

City	Ban all leaf blowers	Ban all gasoline-powered leaf blowers	Ban all leaf blowers during certain seasons	Ban all leaf blowers during certain times of day	Ban all leaf blowers above a certain decibel level
<b>California</b>					
Alameda County				•	
Belvedere		•			
Berkeley		•			
Beverly Hills		•			
Calexico				•	
Carmel		•			
Claremont		•			
Costa Mesa				•	
Culver City				•	
Cypress*		•			
Dana Point*		•			
Davis					•
Del Mar	•				
Foster				•	
Fountain Valley*		•			
Hermosa Beach	•				
Huntington Beach				•	
Indian Wells		•			
Indio				•	
Irvine*		•			
La Palma				•	
Laguna Beach	•				
Lawndale		•			
Loma Linda				•	
Lomita				•	
Long Beach				•	
Los Altos		•			
Los Angeles		•			
Malibu		•			
Manhattan Beach	•				
Manteca				•	
Menlo Park				•	
Mill Valley	•				
Ojai		•			
Orange				•	

Orinda*		•			
Palo Alto		•			
Pasadena				•	
Perris				•	
Piedmont		•			
Richmond				•	
Rohnert Park				•	
Rolling Hills Estates*		•			
Sacramento				•	
San Anselmo				•	
San Diego				•	
Santa Barbara		•			
Santa Monica	•				
Saratoga*		•			
Solana*		•			
Sunnyvale				•	
Tiburon		•			
Tustin*		•			
West Hollywood		•			
Westminster*		•			
<b>Colorado</b>					
Aspen		•			
Carbondale		•			
<b>Connecticut</b>					
Greenwich				•	
<b>Florida</b>					
Palm Beach			•		
<b>Illinois</b>					
Evanston			•		
Highland Park			•		
Wilmette			•		
Winnetka			•		
<b>Maryland</b>					
Montgomery County					•

Massachusetts					
Cambridge				•	
New York					
Bronxville			•		
Flower Hill					•
Great Neck Estates			•		
Greenburgh			•		
Huntington			•		
Larchmont			•		
Mamaroneck			•		
New Rochelle			•		
Newton			•		
North Hempstead				•	
Oyster Bay				•	
Pelham Heights**		•			
Pelham Manor			•		
Pelham Village**		•			
Rye		•			
Scarsdale			•		
Southampton			•		
Tarrytown				•	
Thomaston			•		
White Plains			•		
Yonkers			•		

\* Denotes ban is on Sundays and holidays only

\*\* Denotes ban is in effect summer and winter only

The City of Santa Monica is an example of a city that banned the use of all motorized leaf blowers, actively enforces the ban and is presented below as a case study. Santa Monica banned the use of motorized leaf blowers in 1991, amended the ordinance in 1995 and again in 2010. Santa Monica’s ordinance now holds property owners, water customers, owners and operators of gardening or landscape maintenance services, property management companies, and leaf blower operators (responsible parties) responsible for adhering to the prohibition against the use of motorized leaf blowers and authorized the City’s Office of Sustainability and the Environment (OSE) to issue administrative citations for any violation of the ordinance. Santa Monica OSE published educational information on its website that includes, (1) a summary of the ordinance with a link to the municipal code, (2) information on alternatives to motorized leaf blowers, (3) information for reporting leaf blower violations, (4) downloadable flyers in English and Spanish that property owners can provide to their gardeners to help educate them about the ordinance and (5) information about the environmental, noise and health impacts of leaf blowers.

Additionally OSE staff mailed (1) leaf blower educational materials to all Santa Monica water customers as an insert to their water bills, (2) 222 informational letters regarding the amended ordinance to landscape companies with Santa Monica business licenses, and (3) 182 informational letters to property management companies with Santa Monica business licenses. OSE also published an article in the local paper, distributed bi-lingual flyers at the Farmer’s Markets,



and prepared a public service announcement and slide show for the local television station. OSE incorporated information on the ordinance into their Sustainable Landscape Professionals Educational Series classes and Green Garden Academy workshops.

OSE staff conduct dedicated leaf blower patrols at least two days per week to enforce the ordinance. These patrols typically last four to five hours and are conducted by one staff member using a City vehicle. The patrols are undertaken at various times of day, with the time and location based on previously reported leaf blower use, locations of past violations that have not demonstrated compliance, and known weekly schedules of landscape maintenance companies. Additionally, OSE staff monitor leaf blower use throughout the city during regular enforcement and inspection visits for the urban runoff and water conservation ordinances. Staff also conduct individual site visits in response to reports of leaf blower use from community members that are received via telephone, email or the City reporting system.

If OSE staff observe a leaf blower in use they will inform the operator of the law, give the operator a bi-lingual (English/Spanish) flyer that explains the ordinance and potential penalties for violating it, take a photo if possible, and then send a warning letter and photo to the responsible parties. The letter provides information about the ordinance, states the violation and corrective action, and directs the recipient to respond within two weeks confirming that leaf blowers are no longer being used at the property. If and when a response letter from the recipient is received within two weeks, compliance for that violation is achieved and the case is closed.

In cases where a potential violation is reported by a member of the public that includes specific information regarding the date, time and location of the violation, a warning letter is issued, typically to the property owner, along with a printed bi-lingual flyer about the ordinance for the property owner to provide to their gardener, and the compliance course described above is followed. In cases where a potential violation is reported that does not include specific information regarding the violation, an educational letter (rather than a warning letter) is sent to the involved parties along with a bi-lingual flyer. These locations are then included in future patrol schedules in order to identify in the field potential future violations.

If a repeat violation occurs at a property, OSE will issue a second warning letter. If compliance is not achieved within two weeks of the second warning letter being sent a citation will be issued. In all cases, the responsible parties are provided two warnings before a citation is issued. This is consistent with the procedure for enforcement of the City's urban runoff and water conservation ordinances, which has proven effective at achieving compliance through education. Because many of the violations are reported to OSE by members of the public, the provision of two warnings prior to issuing a citation also allows OSE staff to verify a violation in the field prior to the issuance of a citation.

Findings - It is time consuming and costly for a municipality to enforce a leaf blower ban.

### **Economic Cost of Banning Leaf Blowers for Gardeners/Landscape Maintenance Companies**

A field experiment was performed in Tarzana to determine the effect of the leaf blower ban in Los Angeles in 1996 (<https://www.thefreelibrary.com/GROUND%20ZERO%20IN%20LEAF%20BLOWER%20BATTLE%20:%20RAKE%20AND%20BROOM%20VS.%20GAS-POWERED...-a08403766>).

Two yards of equal size and similar landscaping were maintained by the same gardeners on the same day; one yard was maintained with a leaf blower, the other with a rake and broom. The gardeners spent 23 minutes to maintain the first yard with a leaf blower and 34 minutes to maintain the second yard with a rake and broom. The homeowner of the second yard stated he wasn't as pleased with the gardening service using a rake and broom. The gardeners stated they would have to raise their rates by 40 percent to account for the increase in labor and the reduction in the number of yards they could maintain per day.

Findings - There is an economic impact to the gardening/landscape maintenance industry when a leaf blower ban is passed.

## **Practicable Considerations for Leaf Blower Use – Manufacturers’ Guidelines**

The California Landscape Contractors Association and Outdoor Power Equipment Institute offer the following guidelines for leaf blower use:

- Wear eye and ear protection and avoid loose clothing, scarves or neck chains when using a blower.
- Check the equipment's muffler, air intakes and air filters before operation to make sure they are working properly.
- Operate leaf blowers in residential areas only at reasonable hours (check local ordinances for time limit restrictions); never early in the morning, late at night or on Sundays.
- Limit the number of leaf blowers being used at once on small residential sites. This will keep the sound generated to a minimum.
- Minimize the high-pitched whine by running the blower at the lowest possible throttle speed to do the job. Lower speeds reduce sound and give the operator maximum control. Full throttle is seldom necessary.
- Use the full nozzle extension so the air stream is directed close to the ground to minimize dust.
- Pay close attention to the generation of dust. In dusty conditions, use mister attachments to slightly dampen surfaces. To clean an excessively dusty area, use a shovel to pick up the large debris and do your final cleanup with water.
- Keep debris away from neighbors' yards, the street, vehicles, people or pets. Don't use leaf blowers to move large debris piles from one spot to another.
- Clean up after using blowers. Dispose of debris in trash receptacles or haul it away.

## **Summary**

There are gasoline-powered leaf blowers currently available that meet the USEPA and CARB thresholds for exhaust emissions and operate at or below 65 decibels. Electric leaf blowers have no exhaust and are much quieter than gasoline-powered leaf blowers. A quantitative study of dust emissions indicates suspended particulate matter created by leaf blowers is less than CARB thresholds. It is time consuming and costly for a municipality to enforce a leaf blower ban. There is an economic impact to the gardening/landscape maintenance industry when a leaf blower ban is passed.

## **Alternatives**

1. Complete Ban of Motorized Leaf Blowers – This alternative has been implemented in 6 California cities (Noise Pollution Clearinghouse 2010). A complete ban would address potential exhaust and noise hazards. Dust emissions still would be generated by sweeping with brooms, particularly using a push broom on concrete surfaces (Fitz, D., et al. 2006). Indeed the measured particulate matter, i.e., dust, in the 2006 University of California Riverside study from use of a push broom on concrete was greater than the measured dust from a gasoline-powered leaf blower (Fitz, D., et al. 2006). This alternative is costly to enforce (the City of Santa Monica hired 1 FTE to enforce their ban).
2. Ban Gasoline-powered Leaf Blowers – This alternative has been implemented in 26 California cities (Noise Pollution Clearinghouse 2010). A ban of gasoline-powered leaf blowers would address potential exhaust hazards and to a certain extent potential noise hazards. Electric leaf blowers although quieter than gasoline-powered leaf blowers still generate noise. Dust emissions would be generated, however the 2006 quantitative study conducted at the University of California Riverside indicated the suspended particulate matter (or dust) generated by motorized leaf blowers is less than CARB thresholds. This alternative would require enforcement by City Staff.
3. Require Gasoline-powered Leaf Blowers be model years 2007 or newer and 65db or less – This alternative would address potential exhaust and noise hazards. Dust emissions would be generated, however the 2006 quantitative study conducted at the University of California Riverside indicated the suspended particulate matter (or dust) generated by motorized leaf blowers is less than CARB thresholds. This alternative would require education of the public and could utilize the existing SCAQMD buy-back program. The City of Burlingame requires the gasoline-powered leaf blowers used in their city have a sticker indicating they operate at 65db or less after inspection by City Staff.
4. Education – Provide current and quantifiable studies and reports to the public regarding the potential hazards from the use of motorized leaf blowers.

**Recommendations**

The Board of Health and Human Services recommends Alternative 3 – Require Gasoline-powered Leaf Blowers be model years 2007 or newer and 65db or less – This alternative would address potential exhaust and noise hazards. Dust emissions would be generated, however the 2006 quantitative study conducted at the University of California Riverside indicated the suspended particulate matter (or dust) generated by motorized leaf blowers is less than CARB thresholds. This alternative would require education of the public and could utilize the existing SCAQMD buy-back program.

The Board also recommends: (1) consideration of regulations to require that users of leaf blowers comply with the manufacturers' recommended use of personal protective equipment and manufacturers' guidelines for use, (2) education of operators, regulators and the public about leaf blower safety and health impact issues, (3) further evaluation of the health effects, particularly on operators, and air pollution impacts due to the use of leaf blowers and (4) the subject of leaf blowers and leaf blower technology be reviewed in 5 years as the ultimate goal is zero emissions.